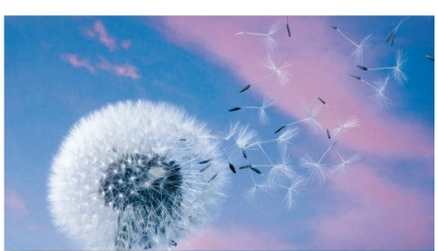
DANI

A Scent Of Future

Environmental SourceBook

WATER ANALYSIS



AIR ANALYSIS

SOIL ANALYSIS

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Despite improvements in some regions, water pollution is on the rise globally. And unless substantial progress is made in regulation and enforcement, pollution is expected to increase as a result of economic development driven by urbanization, industries and intensive agriculture systems.

Source: 3rd United Nations World Water Development Report: WATER IN A CHANGING WORLD

WATER ANALYSIS

Water is among the most precious natural resources. Every living thing on earth needs water to survive and it is of vitally importance to every aspect of our lives. Humanity has always been aware of the importance of water. Aeschylus, more than two thousand years ago, said: "By polluting clear water with slime, you will never find good drinking water".

But nowadays each water source can contain dramatically different levels of pollution. Measurements of pollutant levels in water provide the most fundamental indicator of the status of this resource and are critical and meaningful evaluation of the quality of water.

Monitoring of contaminants is a matter of great importance as it influences human and environmental health.

In the following pages a number of solutions that allow achieving accurate, precise, and reliable results to match the requirements of the regulated water analysis are presented.

DANI has continued to implement innovative techniques by introducing in the market very reliable, extremely versatile and easy to use instruments that meet water monitoring real requirements.

Decades of experience in developing applications for the Environmental industry are the basis of the Master DWA DANI Water Analyzers.

WATER ANALYSIS

“Time is Money.”

Benjamin Franklin

Time is always a key factor in today’s laboratories productivity.

Master your Time with the Master DANI Water Analyzers.

The ability to provide the proper configuration to meet the most challenging analytical demands comes from a long and proven experience and a deep industry knowledge. As requirements are constantly changing, even a highly reliable instrumentation could not be enough to succeed in getting trustworthy results: complete and guaranteed solutions are essential to comply with the latest industry standards and specifications.
After a long working relationship with its customers to know and to best match their real needs, DANI Instruments has developed key analytical solutions that cover a broad array of applications, requirements and protocols in the environmental industry.
Master DANI Water Analyzers are PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS specifically designed for specific analyses. The analyzers include the HARDWARE, the SOFTWARE, COLUMNS AND CONSUMABLES, the OPTIMIZED ANALYSIS METHOD, the ANALYTICAL CONDITIONS, and the DOCUMENTATION to run up your analysis from day one.

PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS

The installation process is faster than ever before and all the startup procedure is oversimplified ensuring immediate analytical performance and results.

HARDWARE AND SOFTWARE

DWA Analyzers are pre-engineered systems based on the versatility, flexibility and robustness of the proven Master GC hardware. All the Master GC parameters are set prior the shipment.

COLUMNS AND CONSUMABLES

No more doubts about the proper column, parts and supplies. DWA Analyzers are delivered with all you may need for your analysis.*

OPTIMIZED ANALYSIS METHOD

Analytical methods are pre-loaded to be immediately used for the determination of pollutants in water. Whenever possible, reduction of analysis time and amounts of toxic solvents are considered. Method development time and costs are thus dramatically reduced.

ANALYTICAL CONDITIONS

DWA Analyzers are designed to perfectly accomplish the analytical conditions of interest.

DOCUMENTATION

A getting started manual, calibration and method files, and all the information for a quick startup are included .

View your Analyzer:

- Master DWA-114 Halogenated Hydrocarbons in Drinking Water Analyzer
- Master DWA-115 Volatile Aromatic Compounds in Drinking Water Analyzer
- Master DWA-119 Volatile Aromatic Hydrocarbons in Water Analyzer
- Master DWA-120 VOCs in Water Analyzer
- Master DWA-121 PCBs in Water Analyzer
- Master DWA-049 BTEX and Styrene in Water Analyzer
- Master DWA-122 Fuel Oxygenates in Water Analyzer
- Master DWA-123 Hydrocarbon Oil Index in Water Analyzer

* Chemicals are not supplied

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Master GC
Fast Gas Chromatograph

High Productivity
Accuracy and Precision
Flexibility and Upgradeability
User Friendly Interface

The versatile and flexible Master GC delivers unsurpassed analytical capabilities meeting today's laboratories productivity requirements. The GC was uniquely designed to perform conventional and fast gas chromatographic analyses.
The primary goal of Fast GC is to maintain proper resolving power in shorter analysis run times by using adequate instrumentation and analytical columns in combination with optimized method parameters. The Master GC features a maximum heating rate up to 140° C/min and a typical cooling time of 4 min. In addition, DANI offers a variety of detectors engineered with fast electronics to handle sharp peaks; data acquisition rates of up to 300 Hz are performed.

Master TOF
Time of Flight GC/MS

Extremely Compact Design
High Productivity
Powerful Software Solution
Walkaway Automation

The Master TOF-MS detector performs the fastest acquisition rates (1000 spectra/s) and the widest linear dynamic range (10^5) available on the market. These capabilities are offered in an extremely compact bench-top instrument. In combination with the Master GC, the system is the ideal solution for Fast GC and GCxGC laboratories.
The Master LAB Software offers the proper tool for the reliable control of the system, from autotuning procedures to GC and sample sequence management. An original deconvolution algorithm capable to handle a large amount of information in a smart and effective way provides trustworthy identification of trace compounds even in complex matrices.

Master SHS
Static Headspace Sampler

A Robust and Flexible System to Meet Complex and Versatile Needs

The Master SHS delivers the highest performances to overcome daily new challenges and supplies trustworthy and enhanced results. The highest sample capacity and the unlimited priority sample position provide straightforward results for virtually any analytical need in real time. The Valve&Loop Technique, the known and fixed volume of the sample, the accurate temperature control and the entirely chemically inert sample flow path guarantee outstanding repeatability and avoid the risk of false results, sample loss or recondensation.

Master DHS/P&T
Dynamic Headspace and Purge&Trap Sampler

A Dynamic Approach to High Sensitivity Headspace Analysis

The Master DHS/P&T provides the most versatile, state-of-the-art system for headspace analysis featuring the capabilities of a Purge&Trap system. It combines the high sensitivity of the Dynamic Headspace technique with the productivity, ease of use, and flexibility of a completely automated solution.
The Master DHS/P&T offers up to a 100-fold increase in sensitivity over conventional headspace techniques and assures detection limits beyond capability of SPME.

Master TD
Thermal Desorber

The Ultimate Solution for High Sensitivity Detection of Volatiles

The Master TD offers superior sensitivity, versatility, and productivity for the extraction of volatile and semi-volatile compounds from air and solid matrices. The excellent analytical performances of the system is guaranteed by the two-stage thermal desorption process and supported by the patented "Instant Desorption" of the trap. This design assures the complete transfer of the analytes and their injection into the analytical column in a narrow band to preserve chromatographic resolution and accuracy. The fully automated control of the system provides high sample capacity and optimal sampling tube processing for maximum system productivity.

WATER ANALYSIS

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Halogenated Hydrocarbons

1,1 dichloroethylene
methylene choride
trans-1,2-dichloroethylene
1,1-dichloroethane
2,2-dichloropripane
cis-1,2-dichloroethylene
chloroform
bromochloromethane
1,1,1-trichloroethane
1,1-dichloropropylene
carbon tetrachloride
1,2-dichloroethane
trichloroethylene
1,2-dichloropropane
bromodichloromethane
dibromomethane
cis-1,3-dichloropropylene
trans-1,3-dichloropropylene
1,1,2-trichloroethane
1,3-dichloropropane
tetrachloroehylene
dibromchloromethane
1,2-dibromoethane
chlorobenzene
1,1,1,2-tetrachloroethane
bromoform
1,1,2,2,-tetrachloroethane
1,2,3-trichloropropane
bromobenzene
2-chlorotoluene
4-chlorotoluene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,2-dichlorobenzene
1,2-dibromo-3-chloropropane
1,2,4-trichlorobenzene
1,2,3-trichlorobenzene

EPA Method 502.2

Application Note AN 114
Halogenated Hydrocarbons in Drinking Water

Master DWA-114
Halogenated Hydrocarbons in Water Analyzer

Volatile Aromatic Organic Compounds

benzene
toluene
ethylbenzene
m-xylene
p-xylene
o-xylene
styrene
iso propylbenzene
n-propylbenzene
bromobenzene
1,3,5-trimethylbenzene
2-chlorotoluene
4-chlorotoluene
tert-buthylbenzene
1,2,4-trimethylbenzylene
sec-Butylbenzene
p-Isopropyltoluene
1,3.Dichlorobenzene
1,4-Dichlorobenzene
n-butylbenzene
1,2-Dichlorobenzene

EPA Method 502.2

Application Note AN 115
Volatile Aromatic Organic Compounds in Water

Master DWA-115
Volatile Aromatic Organic Compounds in Water Analyzer

Volatile Aromatic Hydrocarbons

benzene
toluene
ethylbenzene
p-Xylene
m-Xylene
o-Xylene

Application Note AN 119
Dynamic Determination of Volatile Hydrocarbons

Master DWA-119
Volatile Hydrocarbons in Water Analyzer

VOCs

1,1-dichlorethene
methylene chloride
trans-1,2-dichloroethene
cis-1,2-Dichloroethene
chloroform
carbon tetrachloride
1,1,1-trichloroethane
benzene
1,2-dichloroethane
trichloroetheene
1,2-dichloropropane
bromodichloromethane
cis-1,3-dichloropropene
toluene
trans-1,3-dichloropropene
tetrachloroethane
1,1,2-trichloroethane
dibromochloromethane
m-Xylene
p-Xylene
o-Xylene
bromoform
1,4-dichlorobenzene

Application Note AN 120
Dynamic and Purge & Trap Determination of VOCs

Master DWA-120
VOCs in Water Analyzer

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BTEX and Styrene

benzene
toluene
ethylbenzene
p-xylene
m-xylene
o-xylene
styrene

Application Note AN 049
Determination of BTEX and Styrene in Water

Master DWA-049
BTEX and Styrene in Water Analyzer

Phenols

phenol
2-chlorophenol
2,4-dimethylphenol
2,4-dichlorophenol
4-chloro-3-methylphenol
2,4,6-trichlorophenol
2,4-dinitrophenol
4-nitrophenol
2-methyl-4-dinitrophenol
pentachlorophenol

EPA Method 604
EPA Method 8041

Application Note AN 007
Phenols: Fast GC Analysis

Poly Aromatic Hydrocarbons (PAHs)

naphtalene
2-methylnaphtalene
1-methylnaphtalene
acenaphthylene
acenaphtene
fluorene
phenanthrene
anthracene
fluoranthene
pyrene
benzo[a]anthracene
chrysene
benzo[b]fluoranthene
benzo[k]fluoranthene
benzo[a]pyrene
indeno[1,2,3-cd]pyrene
dibenzo[a,h]anthracene
benzo[g,h,i]perylene

EPA Method 8100

Application Note AN 003
Poly Aromatic Hydrocarbons (PAHs) - Fast GC Application

PCBs

2,4,5,6-tetrachloro-*m*-xylene (S.S)
2,3-dichlrobiphenyl
2,2',5'-trichlorobiphenyl
2,4',5-trichlorobiphenyl
2,2',5,5'-tetrachlorobiphenyl
2,2',3,5'-tetrachlorobiphenyl
2,3',4,4'-tetrachlorobiphenyl
2,2',4,5,5'-pentachlorobiphenyl
2,2',3,4,5'-pentachlorobiphenyl
2,3,3',4',6-pentachlorobiphenyl
2,2',3,5,5',6-hexachlorobiphenyl
2,2',4,4',5,5'-hexachlorobiphenyl
2,2',3,4,5,5'-hexachlorobiphenyl
2,2',3,4,4',5'-hexachlorobiphenyl
2,2',3,4',5,5',6-heptachlorobiphenyl
2,2',3,4,4',5',6-heptachlorobiphenyl
2,2',3,4,4',5,5'-heptachlorobiphenyl
2,2',3,3',4,4',5-heptachlorobiphenyl
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl
decachlorobiphenyl (I.S.)

EPA Method 8082

Application Note AN 121
Fast GC Approach for PCBs Determination

Master DWA-121
PCBs in Water Analyzer

Fuel Oxygenates

TBA
MtBE
DIPE
EtBE
TAME

Application Note AN 122
Fuel Oxygenates in Water

Master DWA-122
Fuel Oxygenates in Water Analyzer

Hydrocarbon Oil Index C7-C40

C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C30
C31
C32
C33
C34
C35
C36
C37
C38
C39
C40

ISO 9377-2 Method

Application Note AN 123
Hydrocarbon Oil Index in Water

Master DWA-123
Hydrocarbon Oil Index in Water Analyzer

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WATER ANALYSIS
Application Notes

WATER ANALYSIS

Halogenated Hydrocarbons in Drinking Water
EPA Method 502.2
Application Note AN 114

Halogenated hydrocarbons can be found in appreciable amounts in surface and drinking waters. Often these contaminants are the result of the chlorination of raw, groundwater or wastewater in order to achieve drinking water quality standards. Contamination of water by halogenated hydrocarbons has been disclosed to be toxic for humans. It's therefore of primary importance to have an easy-to-use, RELIABLE and COMPLETELY AUTOMATED method for this type of analysis. In the following application Gas Chromatography with Purge&Trap concentration and Electron Capture Detection has been applied to the determination of halogenated hydrocarbons in water, ACCORDING TO EPA METHOD 502.2 REQUIREMENTS.

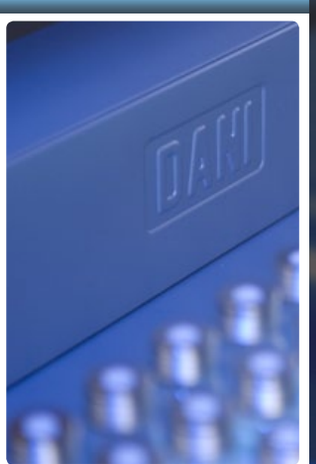
Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-114 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Halogenated Hydrocarbons in Drinking Water.

Master DWA-114

COMPLETE AUTOMATION OF ALL THE ANALYTICAL STEPS FOR AN INCREASED PRODUCTIVITY

Master DHS/P&T allows sample overlapping: the system automatically controls that the next sample is thermostatted during the GC analysis of the previous one. Solutions with different concentrations can also be prepared in a fully automatic way.



RELIABLE SYSTEM WITH NO CARRY-OVER RISK

Each sample is placed in a disposable 20-mL headspace vial. No additional workload of cleaning glassware or line purging is necessary, and the sample needle undergoes on automated cleaning cycle during the baking phase. Furthermore, the entire sample flow path is chemically inert.
All these features prevent carry-over effects.

Analysis Conditions

Master GC Parameters:

Oven	35°C (8 min), 4°C/min, 240°C (1 min)
Detector	ECD 300°C - 40ml/min N_2
Injector	SL/IN (220°C)
Carrier	Helium, 3.5 mL/min, (split 1:2)
Column	Vocol 60 m x 0.32 mm i.d. x 3µm d_f

Master DHS/P&T Parameters - Purging Mode

Incubation	60°C
Stripping	3 min, 120 mL/min, Trap -10°C
Injection	3 min, Dew Stop 0°C, Trap 295°C
Baking	10 min, 80 mL/min Trap 300°C, Dew Stop 200°C
Transfer Line	250°C
Switching Valve	250°C
Trap Material	Tenax/Carbotrap/Carbosieve
Sample Volume	10mL

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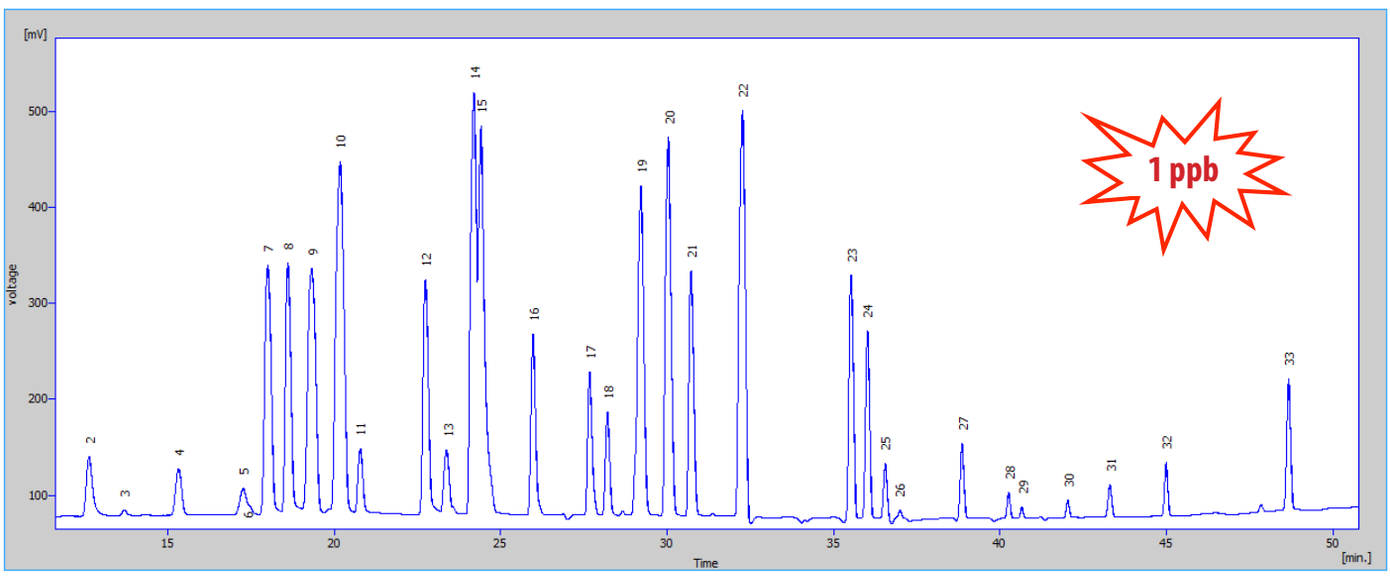
Halogenated Hydrocarbons in Drinking Water
EPA Method 502.2



	COMPOUNDS	RSD%	MDL	R	RANGE	EPA 502.2 RSD%	EPA 502.2 MDL
			ppb		ppb		ppb
1	1,1 dichloroethylene	1.5	0.0100	0.9570	0.1000- 2	2.8	0.07
2	methylene choride	2.0	0.0020	0.9960	0.0100-10	2.9	0.02
3	*trans*-1,2-dichloroethylene	3.0	0.0300	0.9970	0.0100-10	3.7	0.06
4	1,1-dichloroethane	2.2	0.0030	0.9970	0.0200- 2	5.7	0.07
5	2,2-dichloropropane	1.1	0.0050	0.9990	0.0002-10	3.4	0.05
6	*cis*-1,2-dichloroethylene	16.6	0.0100	0.9990	0.0200-10	3.3	0.01
7	chloroform	0.8	0.0005	0.9850	0.0400 -2	2.5	0.02
8	bromochloromethane	0.8	0.0005	0.9940	0.0400 -1	3.0	0.01
9	1,1,1-trichloroethane	0.9	0.0005	0.9980	0.0020 -2	3.3	0.03
10	1,1-dichloropropylene	0.7	0.0003	0.9940	0.0100 -1	3.3	0.02
10	carbon tetrachloride	0.7	0.0003	0.9970	0.0020 -1	3.6	0.01
11	1,2-dichloroethane	0.5	0.0020	0.9980	0.0100 -1	3.8	0.03
12	trichloroethylene	1.2	0.0005	0.9980	0.0100 -1	3.6	0.01
13	1,2-dichloropropane	1.3	0.0020	0.9960	0.0020 -1	3.7	0.01
14	dromodichloromethane	0.8	0.0003	0.9950	0.040 -0.1	2.9	0.02
15	dibromomethane	1.6	0.0003	0.9640	0.0100 -1	1.5	0.02
16	*cis*-1,3-dichloropropylene	2.0	0.0007	0.9940	0.0002 -2	3.7	0.06
17	*trans*-1,3-dichloropropylene	1.6	0.0010	0.9970	0.0002 -2	33.7	0.01
18	1,1,2-trichloroethane	1.5	0.0014	0.9950	0.0002 -2	5.6	N.D.
19	1,3-dichloropropane	0.7	0.0004	0.9980	0.0400 -2	3.1	0.03
19	tetrachloroehylene	0.7	0.0004	0.9980	0.0400 -2	2.5	0.04
20	dibromchloromethane	0.5	0.0003	0.9600	0.0400 -1	2.8	0.08
21	1,2-dibromoethane	0.9	0.0005	0.9940	0.0020 -1	6.7	2.20
22	chlorobenzene	0.9	0.0003	0.9950	0.0100 -1	3.6	0.01
22	1,1,1,2-tetrachloroethane	0.9	0.0003	0.9950	0.0100 -1	2.3	0.01
23	bromoform	1.0	0.0005	0.9980	0.0100 -1	5.2	1.60
24	1,1,2,2-tetrachloroethane	1.6	0.0007	0.9987	0.0002-1	6.8	0.01
25	1,2,3-trichloropropane	0.8	0.0025	0.9972	0.0100 -1	2.3	0.40
26	bromobenzene	1.6	0.0120	0.9951	0.2000 -2	2.7	0.03
27	2-chlorotoluene	3.3	0.0020	0.9977	0.0200 -2	2.7	0.01
27	4-chlorotoluene	3.3	0.0020	0.9976	0.0200 -2	3.2	0.01
28	1,3-dichlorobenzene	0.2	0.0070	0.9993	0.2000-10	4.0	0.02
29	1,4-dichlorobenzene	3.4	0.0180	0.9989	0.4000-10	2.3	0.01
30	1,2-dichlorobenzene	3.0	0.0100	0.9985	0.2000-10	1.5	0.02
31	1,2-dibromo-3-chloropropane	4.0	0.0050	0.9976	0.2000 -2	11.3	3.00
32	1,2,4-trichlorobenzene	2.8	0.0040	0.9989	0.1000-10	2.1	0.03
33	1,2,3-trichlorobenzene	2.5	0.0011	0.9994	0.1000-10	3.1	0.03

WATER ANALYSIS

Volatile Aromatic Organic Compounds in Drinking Water
A Dynamic Approach to EPA Method 502.2
Application Note AN 115

Drinking water containing high level of volatile organic compounds may be harmful to human health. The U.S. Environmental Protection Agency estimates that VOCs are present in one fifth of the Nation's water supplies. Some VOCs are mutagens, teratogens, and carcinogens.
EPA Method 502.2 is a general purpose method for the identification and simultaneous measurement of purgeable volatile organic compounds in finished drinking water, or drinking water in any treatment stage.
In the following application the use of Dani Master DHS/P&T operating in "purging mode" for the determination of VOCs ACCORDING TO EPA METHOD 502.2 is presented. The Master DHS/P&T is the solution of choice to reach HIGHER PRODUCTIVITY and INCREASED SENSITIVITY.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-115 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Volatile Aromatic Organic Compounds in Drinking Water.

Master DWA-115

HIGHER PRODUCTIVITY

Overlapped thermostatted sample capability.
Shorter baking phase.
Use of disposable vials.

INCREASED SENSITIVITY

Superior sensitivity is obtained through the constant sweeping of the thermostatted sample, promoting the enrichment of the volatile compounds in the sorbent trap. The Master DHS/P&T offers a 100-fold increase in sensitivity over conventional headspace techniques.

THE CONFIGURATION MATCHES THE EPA METHOD 502.2

The system exceeds the low-level threshold required by the latest regulations.

Analysis Conditions

Master GC Parameters:

Oven	35°C (8 min), 4°C/min, 240°C (1 min)
Detector	FID 250°C
Injector	SL/IN (220°C)
Carrier	Helium, 3,5 mL/min, (split 1:2)
Column	Vocol 60 m x 0.32 mm i.d. x 3µm d_f

Master DHS/P&T Parameters - Purging Mode

Incubation	60°C
Stripping	3 min, 120 mL/min, Trap -10°C
Injection	3 min, Dew Stop 0°C, Trap 295°C
Baking	10 min, 80 mL/min Trap 300°C, Dew Stop 200°C
Transfer Line	250°C
Switching Valve	250°C
Trap Material	Tenax/Carbotrap/Carbosieve
Sample Volume	10mL

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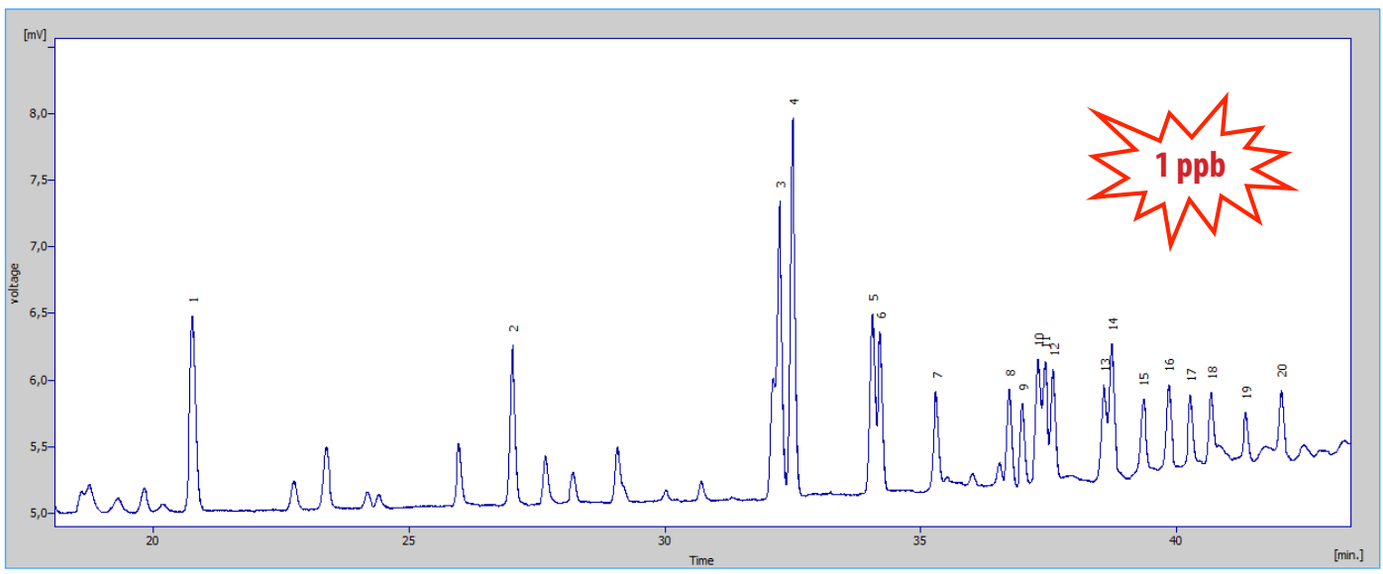
Volatile Aromatic Organic Compounds in Drinking Water
A Dynamic Approach to EPA Method 502.2



	COMPOUNDS	RSD%	MDL	R^2	RANGE
			ppb		ppb
1	benzene	2.0	0.12	0.99952	0.4-10
2	toluene	2.1	0.12	0.99900	0.4-10
3	ethylbenzene	2.6	0.13	0.99851	0.4-10
4	*m*-xylene	7.9	0.09	0.99987	0.4-10
4	*p*-xylene	7.9	0.09	0.99987	0.4-10
5	*o*-xylene	4.0	0.15	0.99978	0.4-10
6	styrene	1.5	0.16	0.99935	0.4-10
7	*iso*-propylbenzene	1.7	0.25	0.99793	0.4-10
8	*n*-propylbenzene	2.4	0.25	0.99804	0.4-10
9	bromobenzene	0.9	0.32	0.99940	0.4-10
10	1,3,5-trimethylbenzene	0.3	0.19	0.99890	0.4-10
11	2-chlorotoluene	4.7	0.20	0.99932	0.4-10
12	4-chlorotoluene	1.0	0.20	0.99887	0.4-10
13	*tert*-buthylbenzene	1.2	0.24	0.99894	0.4-10
14	1,2,4-trimethylbenzylene	0.5	0.18	0.99870	0.4-10
15	*sec*-butylbenzene	0.1	0.30	0.99829	0.4-10
16	*p*-isopropyltoluene	5.0	0.30	0.99815	0.4-10
17	1,3-dichlorobenzene	1.8	0.40	0.99879	0.4-10
18	1,4-dichlorobenzene	1.4	0.40	0.99889	0.4-10
19	*n*-butylbenzene	2.8	0.60	0.99674	0.4-10
20	1,2-dichlorobenzene	2.9	0.40	0.99874	0.4-10

WATER ANALYSIS

Dynamic Determination of Volatile Aromatic Hydrocarbons in Water

Application Note AN 119

Due to their toxicity and persistance in the environment, Volatile Aromatic Organic Compounds are particularly dangerous pollutants. About their possibile effects on human health, it is important to highlight that some of them are mutagens, terategens or carcinogens. For these reasons, government agencies require these contaminants to be monitored at progressive lower levels. The qualitative confirmation, quantitative accuracy and precision required in current regulations demand for high performing analytical solutions. In this work Master DHS/P&T coupled to Master GC demonstrates that the Purge&Trap is the technique of choice when in need to reach the minimum detectable levels required by law in force. This is demonstrated in the analysis reported below that shows **EXCELLENT CHROMATOGRAPHIC RESOLUTION** and **REPEATABILITY** with **NO RISK OF CROSS-CONTAMINATION**.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-119 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Volatile Aromatic Hydrocarbons in Water.

Master DWA-119

EXCELLENT CHROMATOGRAPHIC RESOLUTION

The high desorption efficiency and the minimized sample path dead volume of the Master DHS/P&T guarantee unequalled chromatographic resolution.

EXCEPTIONAL REPEATABILITY

A sophisticated control of all parameters and the highly precise electronic regulation of the purging gas flow-rate feature an unmatched repeatability (<2.5% RSD) and accuracy.

NO RISK OF CROSS-CONTAMINATION

The Purge&Trap technique is based on the injection of vapors only, therefore ensuring a totally clean procedure and highly reliable results. The Master DHS/P&T, moreover, provides an automated cleaning cycle during the baking phase.

Analysis Conditions

Master GC Parameters:

Oven	40°C (3 min), 8°C/min, 160°C, 20°C/min, 230°C (5min)
Detector	FID 250°C
Injector	SL/IN (220°C)
Carrier	1.6 mL/min., (split 1:15)
Column	DN WAX 30m x 0.25 mm i.d. x 0.15 µm d_f

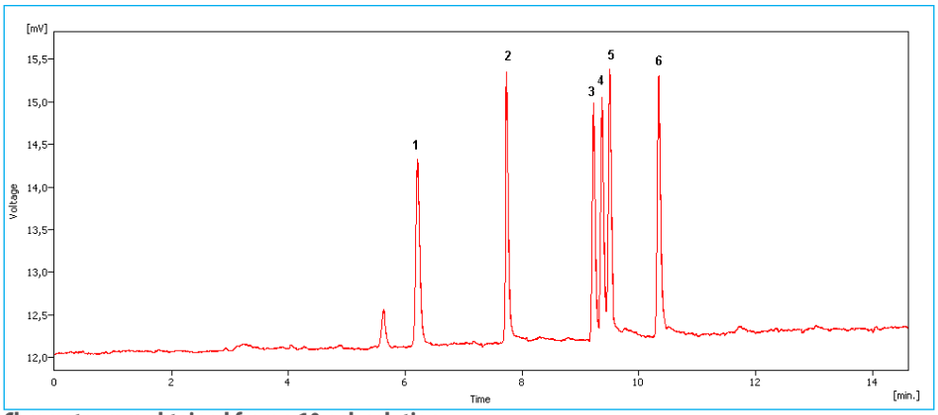
Master DHS/P&T Parameters - Purging Mode

Incubation	40°C
Stripping	15 min, 43 mL/min, Trap 30°C
Injection	1 min, Dew Stop 0°C, Trap 230°C
Baking	10 min, 80 mL/min Trap 280°C, Dew Stop 200°C
Transfer Line	200°C
Switching Valve	200°C
Trap Material	Tenax GR
Sample Volume	5 mL

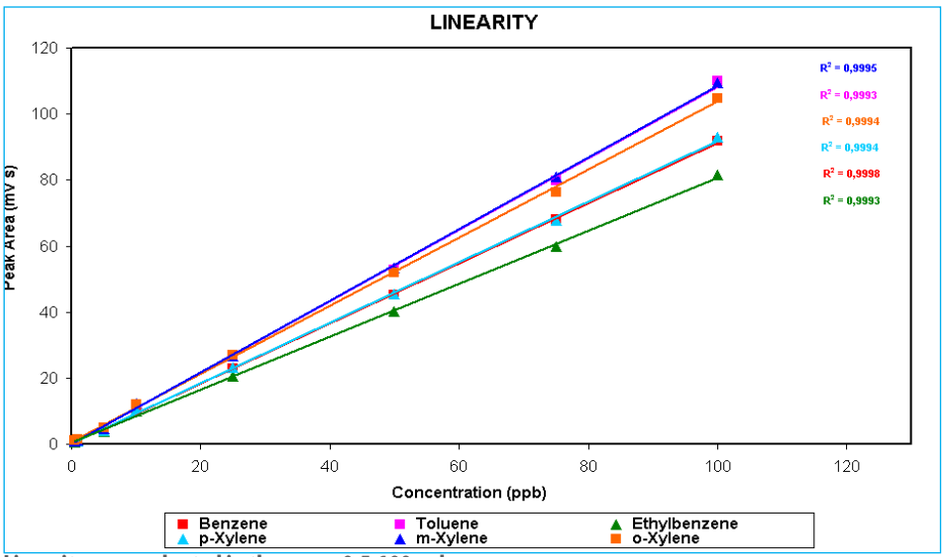
DANI
A SCENT OF FUTURE

Dynamic Determination of Volatile Aromatic Hydrocarbons in Water

Peakidentification	
1	benzene
2	toluene
3	ethylbenzene
4	*p*-xylene
5	*m*-xylene
6	*o*-xylene



Chromatogram obtained from a 10 ppb solution



Linearity was evaluated in the range 0.5-100 ppb

	benzene	toluene	ethylbenzene	*p*-xylene	*m*-xylene	*o*-xylene
MDL (ppb)	0.14	0.086	0.11	0.099	0.091	0.089

Assuming a Minimum Detectable Level 3 times the noise

	PEAK AREA					
	benzene	toluene	ethylbenzene	*p*-xylene	*m*-xylene	*o*-xylene
	53.87	63.38	49.48	56.12	61.81	62.43
	51.80	61.79	48.16	54.28	61.01	61.18
	53.30	62.72	48.82	54.70	60.91	61.94
	50.91	60.76	46.51	52.66	58.47	60.85
	51.43	59.54	46.73	53.07	59.01	60.17
	53.35	62.77	48.37	55.33	61.34	62.90
	53.08	63.07	49.42	55.97	61.26	62.69
	54.35	64.54	49.76	56.52	62.64	63.88
	52.13	62.57	48.38	55.08	61.40	61.75
Average	52.69	62.35	48.40	54.86	60.87	61.98
SD	1.17	1.48	1.15	1.33	1.32	1.14
RSD%	2.22	2.37	2.38	2.43	2.17	1.84

The repeatability obtained for a 50 ppb solution

WATER ANALYSIS

Automatic Dynamic Headspace and Purge&Trap Sampler for the Determination of VOCs in Water

Application Note AN 120

Volatile Organic Compounds (VOCs) are organic chemicals for the most part dangerous for human health or harmful for the environment. Some of them are mutagens, teratogens or carcinogens. This is why VOCs are highly regulated by norms. The qualitative confirmation, quantitative accuracy and precision required in current regulations demand for high performing analytical solutions.

Purge&Trap is THE PREFERRED TECHNIQUE for its higher sensitivity, if compared to Static Headspace, when analyzing very low concentrations.

The aim of the following application is to show the PRECISE RESULTS and THE HIGH SENSITIVE LEVELS OF ANALYSIS obtained with the EASY-TO-USE Master DHS/P&T.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-120 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of VOCs in Water.

Master DWA-120

THE PREFERRED TECHNIQUE FOR THE ANALYSIS OF VOCs

The Master DHS/P&T provides the highest sensitivity and the capability to analyze water samples at very low concentrations using the Purge&Trap technique.

ACCURATE, PRECISE, AND EASY-TO-USE SOLUTION

Unlike conventional Purge&Trap systems, the overlapped sample thermo-statting capability, the shorter baking phase, and the use of disposable vials allow the Master DHS/P&T to maximize productivity with simplicity.

HIGH SENSITIVITY

Highest sensitivity and excellent performances are guaranteed by the use of the ECD - Electron Capture Detector.

Analysis Conditions

Master GC Parameters:

Oven	40°C (6 min), 14°C/min., 230°C (11 min)
Detector	FID, 250°C, ECD 300°C
Carrier	Helium, 1 mL/min, (split 1:10)
Column	Rtx-VMS, 60 m x 0.25mm i.d. x 1.4 µm d_f
Injector	SL/IN (230°C)

Master DHS/P&T Parameters - Purging Mode

Incubation	40°C
Stripping	10 min, 60 mL/min, Trap 20°C
Injection	1 min, Dew Stop 0°C, Trap 230°C
Baking	10 min, 80 mL/min Trap 250°C, Dew Stop 200°C
Transfer Line	200°C
Switching Valve	200°C
Trap Material	Tenax/Carbotrap/Carbosieve
Sample Volume	10 mL

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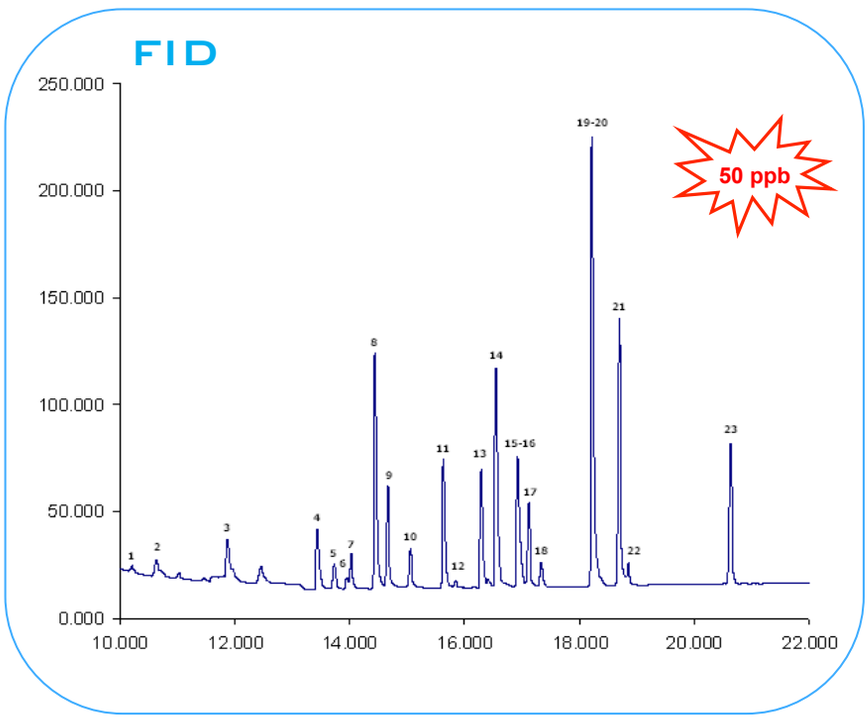
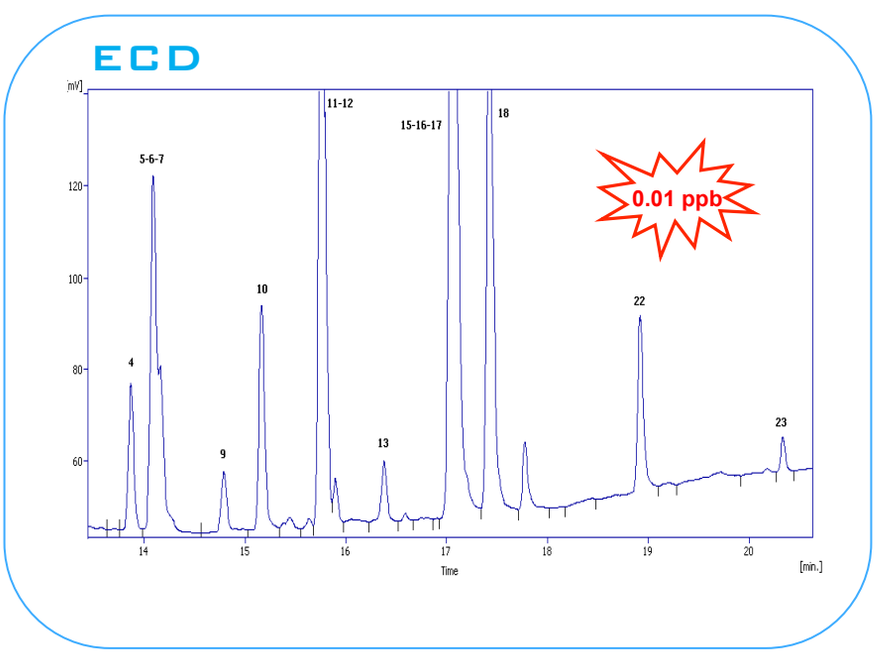
Automatic Dynamic Headspace and Purge&Trap Sampler for the Determination of VOCs in Water



The 50 ppb standard solution was analyzed with FID



The 0.01 ppb standard solution was analyzed with ECD

Peak identification	
1	1,1-dichlorethene
2	methylene chloride
3	*trans*-1,2-dichloroethene
4	*cis*-1,2-dichloroethene
5	chloroform
6	carbon tetrachloride
7	1,1,1-trichloroethene
8	benzene
9	1,2-dichloroethane
10	trichloroethene
11	1,2-dichloropropene
12	bromodichloromethane
13	*cis*-1,3-dichloropropene
14	toluene
15	*trans*-1,3-dichloropropene
16	tetrachloroethane
17	1,1,2-trichloroethane
18	dibromochloromethane
19	*m*-xylene
20	*p*-xylene
21	*o*-xylene
22	bromoform
23	1,4-dichlorobenzene

WATER ANALYSIS

Determination of BTEX and Styrene in Water Using Static Headspace

Application Note AN 049

BTEX and Styrene are Volatile Organic Compounds derived from petroleum and from the emissions of motor vehicles. These compounds are known for the contamination of soils and groundwater and for their harmful effects on human health.
Because of their volatility, Static Headspace is an advisable technique for the analysis of BTEX and Styrene in water. Moreover, unlike other sample handling methodologies, Static Headspace is an easy-to-use, solvent-free, and robust technique.
The aim of the following work is to show that by using the state-of-the-art DANI Master SHS, it is possible to achieve **HIGHLY ACCURATE RESULTS** at ppb levels even for small sample volumes at low concentrations. This approach **ELIMINATES THE RISKS OF CARRY-OVER AND CROSS-CONTAMINATION** and allows to save time **INCREASING LABORATORY PRODUCTIVITY**.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-049 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of BTEX and Styrene in Water.

Master DWA-049

INCREASED LABORATORY PRODUCTIVITY

120 Sample Tray guarantees the highest sample capacity for the highest productivity.

SAMPLE INTEGRITY PRESERVATION

The sample flow path of the Master SHS is entirely chemically inert and can be thermostatted to high temperatures. These features eliminate analytical carryover and maintain sample integrity.

HIGH ACCURACY AT VERY LOW CONCENTRATION

The Valeve&Loop technique is the most reliable and used technique which is capable of highly repeatable results. Master SHS can guarantee outstanding repeatability and avoid the risk of false results, sample loss or recondensation.

Analysis Conditions

Master GC Parameters:

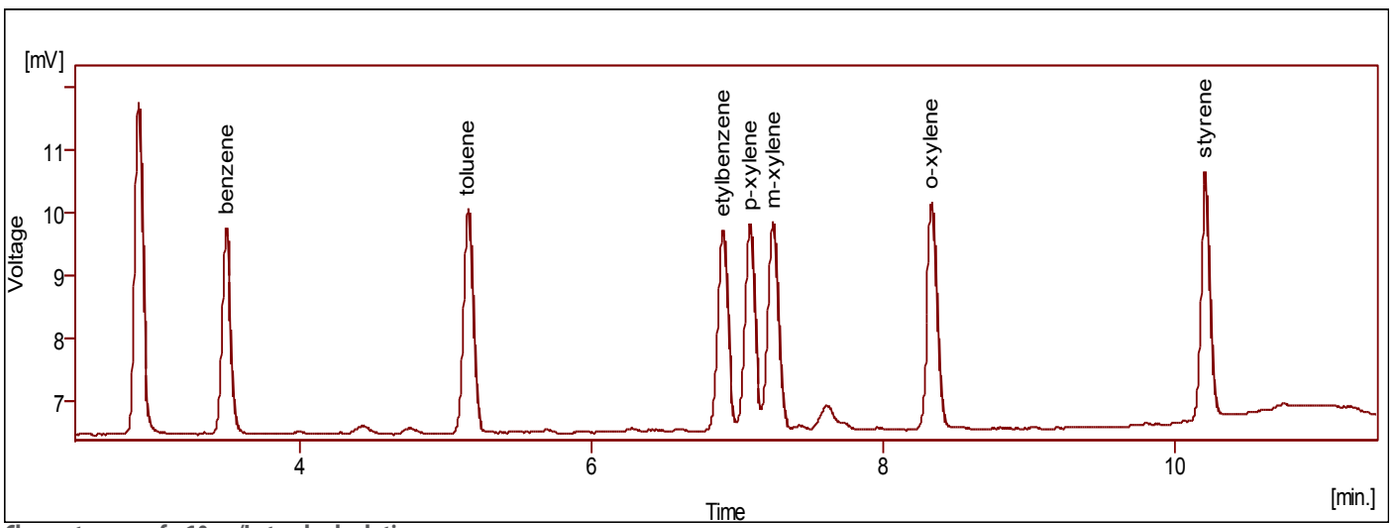
Oven	40°C, 5°C/min., 110°C (5 min), 20°C/min., 200°C
Detector	FID, 250°C
Injector	SL/IN, 150°C
Injection mode	split, split flow 10 mL/min , split ratio 1:1
Carrier	Helium, 10 mL/min
Column	DN-WAX, 25m x 0.53 mm i.d. x 1.2 µm d_f
Sample Volume	BTEX and Styrene in water 10 mL

MasterSHS parameters:

Manifold	85°C
Oven	75°C
Transfer Line	85°C
Incubation Time	30 min
Aux. Gas	0.7 bar

DANI
A SCENT OF FUTURE

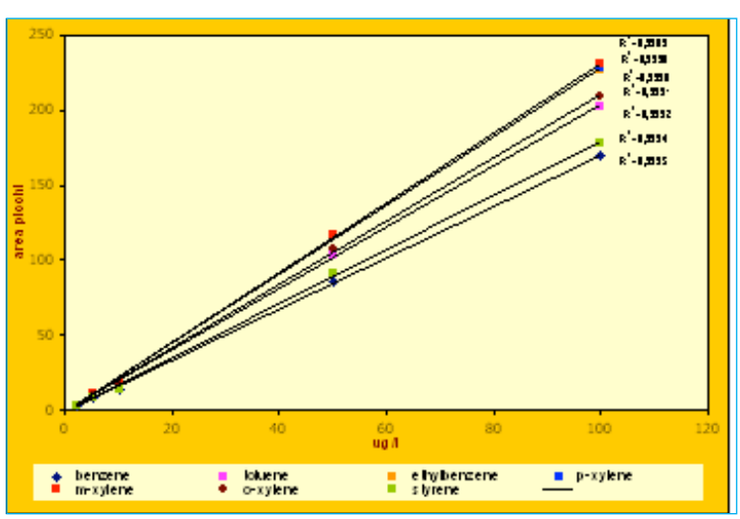
Determination of BTEX and Styrene in Water Using Static Headspace



Chromatogram of a 10 µg/L standard solution

	benzene	toluene	ethylbenzene	*p*-xylene	*m*-xylene	*o*-xylene	styrene
1	14.21	16.63	17.59	17.56	18.05	16.82	14.99
2	14.27	16.40	17.44	17.33	17.74	1.,79	14.87
3	14.21	16.16	17.12	16.94	17.34	16.54	14.63
4	14,12	15.87	17.05	16.82	17.17	16.29	14.58
5	14.01	16.04	17.24	16.84	17.34	16.36	14.85
6	13.87	16.05	17.02	16.87	17.17	16.32	14.71
Average	**14.12**	**16.19**	**17.24**	**17.06**	**17.48**	**16.52**	**14.77**
SD	0.15	0.28	0.23	0.31	0.34	0.24	0.16
RSD%	**1.06**	**1.72**	**1.32**	**1.81**	**1.97**	**1.43**	**1.05**

Repeatability and RSD%, obtained for a 10 µg/L standard solution, are calculated on six repetitions



System linearity calculated in a range from 0.2 to 100 µg/L

WATER ANALYSIS

Phenols: FAST GC ANALYSIS

Application Note AN 007

Phenols are a class of very common chemical compounds. They can be found in the natural world and they are also used as raw materials and additives for industrial purposes in preservatives, insecticides, and plastics. Releases of phenols in water result from wastewater from manufacturing industries and from commercial use of phenol and phenol-containing products. Phenols have been detected in surface waters, groundwater, drinking water and at hazardous waste sites.
They represent a danger to the environment and to human health. In fact, phenols are hematotoxic and hepatotoxic, provoke mutagenesis and carcinogenesis towards humans and other living organisms. The presence of phenols should be limited to 0.3 milligrams per liter of water to protect human health from the possible harmful effects of exposure to phenol by drinking water and/or eating contaminated water plants and animals.
For this reason U.S. EPA takes into account the analysis of phenols in a variety of methods including EPA Method 604 and 8041.

The following analysis demonstrates a **Fast GC Analysis** for eleven target compounds in less than five minutes showing a **Cost-Effective Method** with **High Resolution Power** and **Excellent Accuracy**.

COST-EFFECTIVE METHOD FOR THE FAST DETERMINATION OF PHENOLS IN WATER

Conventional GC average analysis time: 30 minutes.
DANI Master GC analysis time : less than 5 minutes.

HIGH RESOLUTION POWER AND EXCELLENT ACCURACY

The Fast Dedicated Column with narrower internal diameter and thinner stationary phase films features faster analysis time while maintaining proper resolving power.

SUPERIOR RETENTION TIME STANDARD DEVIATION

Great precision is obtained with an average Retention Time Standard Deviation of 0.0013 min

Analysis Conditions

Master GC Parameters:

Oven	80°C (1min) 40°C/min, 220°C, (0.5min)
Detector	FID 400° C
Injector	PTV 80°C, 600°C/min, 400°C
Split Flow	25mL/min, split ratio 1:50
Carrier	H_2 0.5mL/min
Column	DN 5 FAST 15m x 0.10mm i.d. x 0.10 µm d_f
Sample Volume	0.5 µL

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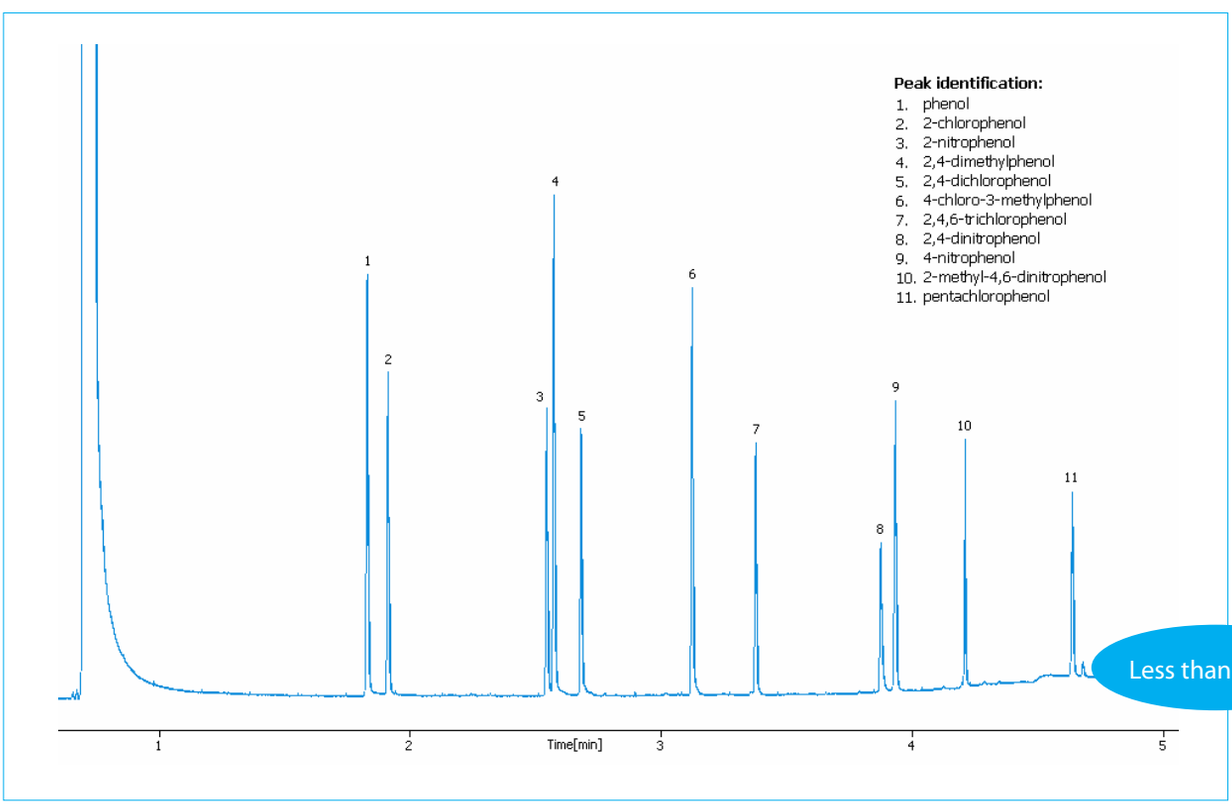
Phenols: FAST GC ANALYSIS



Compounds	Retention Time Std dev. (min)	Compounds	Retention Time Std dev. (min)
phenol	0,0013	2,4,6-trichlorophenol	0,0012
2-chlorophenol	0,0013	2,4-dinitrophenol	0,0016
2-nitrophenol	0,0016	4-nitrophenol	0,0010
2,4-dimethylphenol	0,0015	2-methyl-4-dinitrophenol	0,0013
2,4-dichlorophenol	0,0013	pentachlorophenol	0,0015
4-chloro-3-methylphenol	0,0012		

WATER ANALYSIS

Poly Aromatic Hydrocarbons (PAHs) - Fast GC Application

Application Note AN 003

PAHs are by-products of petroleum processing or combustion. Many of these compounds are highly carcinogenic and organic pollutants at relatively low levels. Although they are nearly insoluble in water, their highly hazardous nature justifies the need for monitoring their presence in potable waters and wastewaters. As proof of this, the Environmental Protection Agency has included 16 PAHs on its list of priority pollutants to be monitored.
U.S. EPA 8100 method provides gas chromatographic conditions for the detection of ppb levels of certain polyaromatic hydrocarbons.
The aim of the following application is to present the FAST ANALYSIS of 18 representatives of the PAHs class of compounds at concentrations that MEET THE EPA METHOD REQUIREMENTS in less than 10 minutes. The results show OUTSTANDING RESOLUTION POWER.

PAHs FASTEST ANALYSIS

Fast Dedicated Column (DN-PAH-FAST).
Fast Acquisition Rate of the Detector (300 Hz).

OUTSTANDING RESOLUTION POWER

The system , along with the optimal control of the oven temperature and the fast detector, assures an outstanding resolution power, unprecedent for all chromatographic measurements.

REGULATORY COMPLIANT RESULTS

Analysis Conditions

Master GC Parameters:

Oven	140°C (0.5min) 30°C/min, 220°C, 15°C/min, 300°
Detector	FID 400° C
Injector	PTV 80°C, 600°C/min, 400°C
Split Flow	50 mL/min, split ratio 1:100
Carrier	H_2 0.5mL/min
Column	DN PAH FAST 15m x 0.10mm i.d. x 0.10 µm d_f
Sample Volume	0.5 µL

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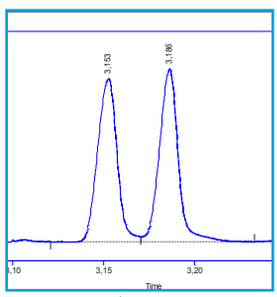
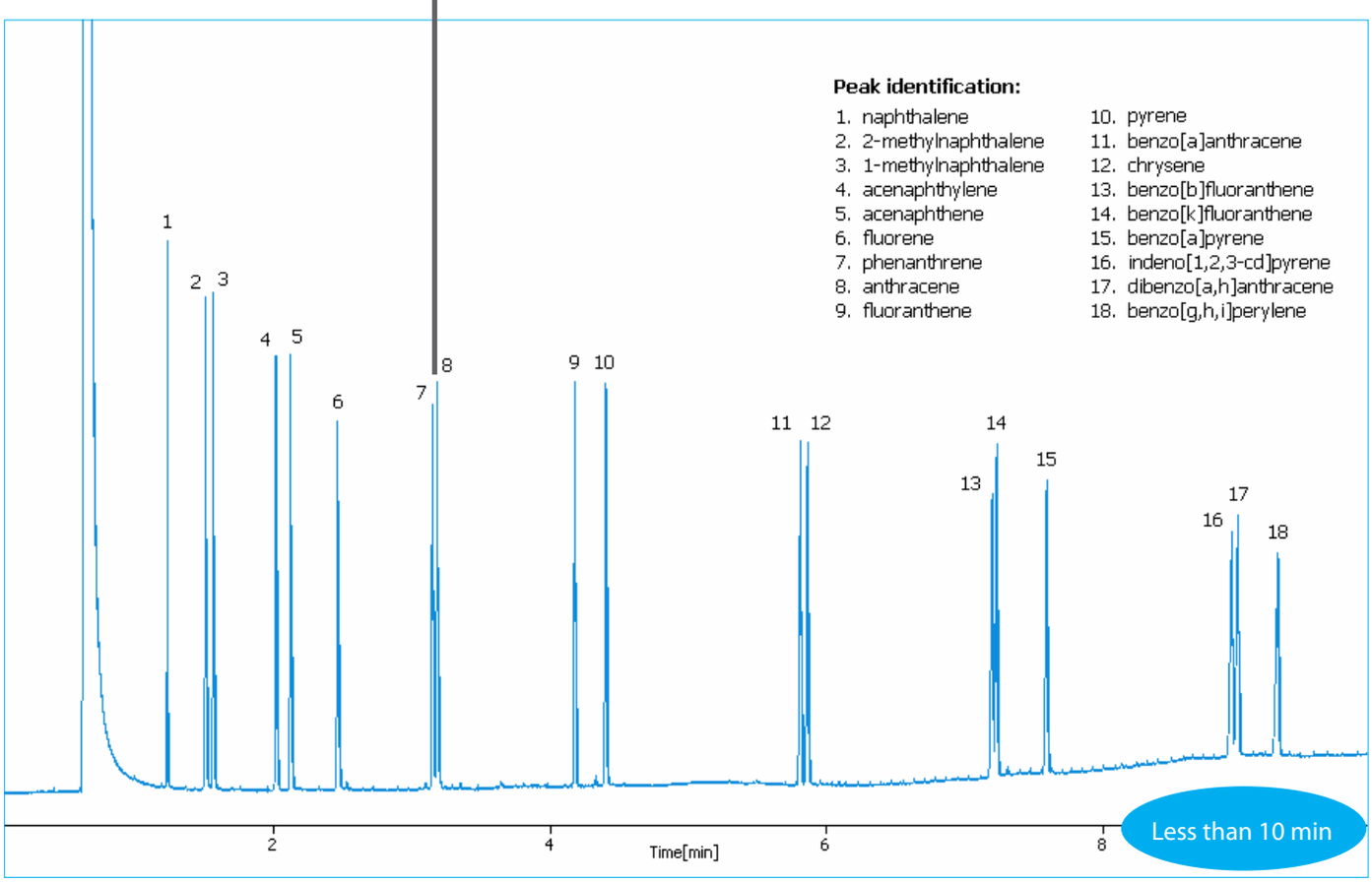
Poly Aromatic Hydrocarbons (PAHs) - Fast GC Application



phenanthrene and anthracene resolution value : 1.35



WATER ANALYSIS

Fast GC approach for PCBs Determination

Application Note AN 121

Polychlorinated biphenyls are a class of organic compounds known for their high level of toxicity and classified as persistent organic pollutants. Thanks to their useful characteristics such as non-flammability, heat resistance, insulation and chemical stability, in the past they were extensively used as coolants and dielectric fluids, stabilizing additives in PVC and plastic products, reactive flame retardants, sealants, paints, etc.

The toxicity associated to PCBs was recognized and known very soon, since before their first commercial production in 1970s. Nevertheless, PCB production was banned by the United States Congress only in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.

The **EPA METHOD 8082** is used to determine the concentration of PCBs in extracts from solid and aqueous matrices. The analytical protocol is based on conventional gas chromatography coupled to electron capture detection technique. This method generally requires 20-30 minutes for the chromatographic separation of these compounds. Fast gas chromatography, typically involving 100 µm i.d. and 10 m columns, represents a powerful alternative to conventional GC, allowing to achieve equivalent **RESOLUTION IN SIGNIFICANTLY SHORTER ANALYSIS TIME**.

In this application, fast GC is applied to the analysis of PCBs. The technique is implemented on DANI Master GC, which operates with short narrow bore columns and fast ECD to guarantee high resolution and sensitivity. The data obtained confirm the suitability of the technique for the routine analysis of this kind of compounds.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-121 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of PCBs in Water.

Master DWA-121

SIGNIFICANT REDUCTION OF THE ANALYSIS TIME WITHOUT LOSS OF RESOLUTION

High acquisition rate up to 300 Hz
High separation power of the column

FAST AND CONVENTIONAL ANALYSIS IN A UNIQUE SYSTEM

The versatile and flexible Master GC is uniquely designed to perform both conventional and fast gaschromatographic analyses.

ACHIEVEMENT OF THE LIMITS SET BY THE EPA METHOD

EPA Method 8082 mandates quantitation limits down to 0,17 ng/L

	Conventional GC	Fast GC	
Column	DN 5-30m x 0.25mm i.d. x 0.25µm d_f	DN 5 - 10m x 0.1mm i.d. x 0.2µm d_f	DN 5 - 5m x 0.1mm i.d. x 0.2µm d_f
PTV Injector	50°C, 600°C/min, 320°C (2min)	50°C, 600°C/min, 320°C (2min)	50°C, 600°C/min., 320°C (2min.)
Oven	120°C, 10°C/min, 300°C (4min)	120°C, 25°C/min, 200°C, 20°C/min., 300°C/min (2 min)	120°C, 25°C/min., 200°C, 20°C/min., 300°C/min. (2 min.)
Carrier Gas (Helium) Flow Rate	1mL/min	0.5 mL/min	0.5 mL/min.
Split Ratio	1:10	1:50	1:50
ECD Detector	320°C	320°C	320°C
Digital Aquisition Rate	25 Hz	300 Hz	300 Hz
Injection Volume	1µL	0.5 µL	0.5 µL

DANI
A Scent Of Future

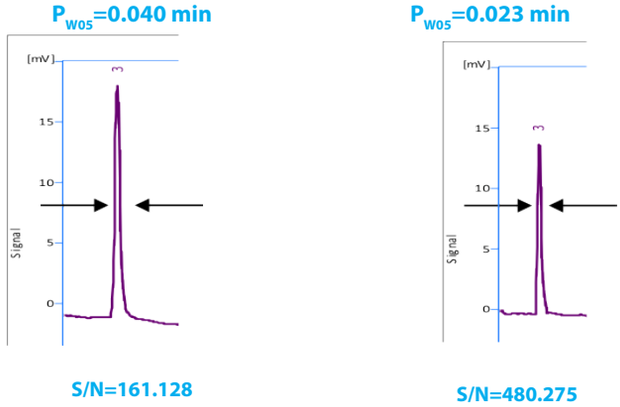
Fast GC approach for PCBs Determination

Compound	Repeatability (min)		Water Sample Limit ng/L	
	RT (SD)	Area (RSD)	LOD	LOQ
1) 2,4,5,6-tetrachloro-*m*-xylene (S.S)	0.001	1.011	0.052	0.175
2) 2,3-dichlrobiphenyl	0.001	0.819	3.030	10.101
3) 2,2′,5′-trichlorobiphenyl	0.000	1.021	5.607	18.692
4) 2,4′,5-trichlorobiphenyl	0.002	1.267	4.511	15.038
5) 2,2′,5,5′-tetrachlorobiphenyl	0.001	1.667	3.593	11.976
6) 2,2′,3,5′-tetrachlorobiphenyl	0.001	1.584	2.439	8.130
7) 2,3′,4,4′-tetrachlorobiphenyl	0.002	1.101	2.120	7.067
8) 2,2′,4,5,5′-pentachlorobiphenyl	0.001	1.757	2.120	7.067
9) 2,2′,3,4,5′-pentachlorobiphenyl	0.002	1.319	1.354	4.515
10) 2,3,3′,4′,6-pentachlorobiphenyl	0.002	0.942	1.304	4.348
11) 2,2′,3,5,5′,6-hexachlorobiphenyl	0.002	1.509	1.017	3.390
12) 2,2′,4,4′,5,5′-hexachlorobiphenyl	0.002	1.770	0.789	2.632
13) 2,2′,3,4,5,5′-hexachlorobiphenyl	0.001	1.572	0.589	1.963
14) 2,2′,3,4,4′,5′-hexachlorobiphenyl	0.001	1.274	0.913	3.044
15) 2,2′,3,4′,5,5′,6-heptachlorobiphenyl	0.002	1.725	0.557	1.857
16) 2,2′,3,4,4′,5′,6-heptachlorobiphenyl	0.002	0.917	0.507	1.691
17) 2,2′,3,4,4′,5,5′-heptachlorobiphenyl	0.002	0.950	0.489	1.630
18) 2,2′,3,3′,4,4′,5-heptachlorobiphenyl	0.001	1.385	0.503	1.675
19) 2,2′,3,3′,4,4′,5,5′,6-nonachlorobiphenyl	0.002	1.132	0.500	1.668
20) decachlorobiphenyl (I.S.)	0.002	1.364	0.039	0.130

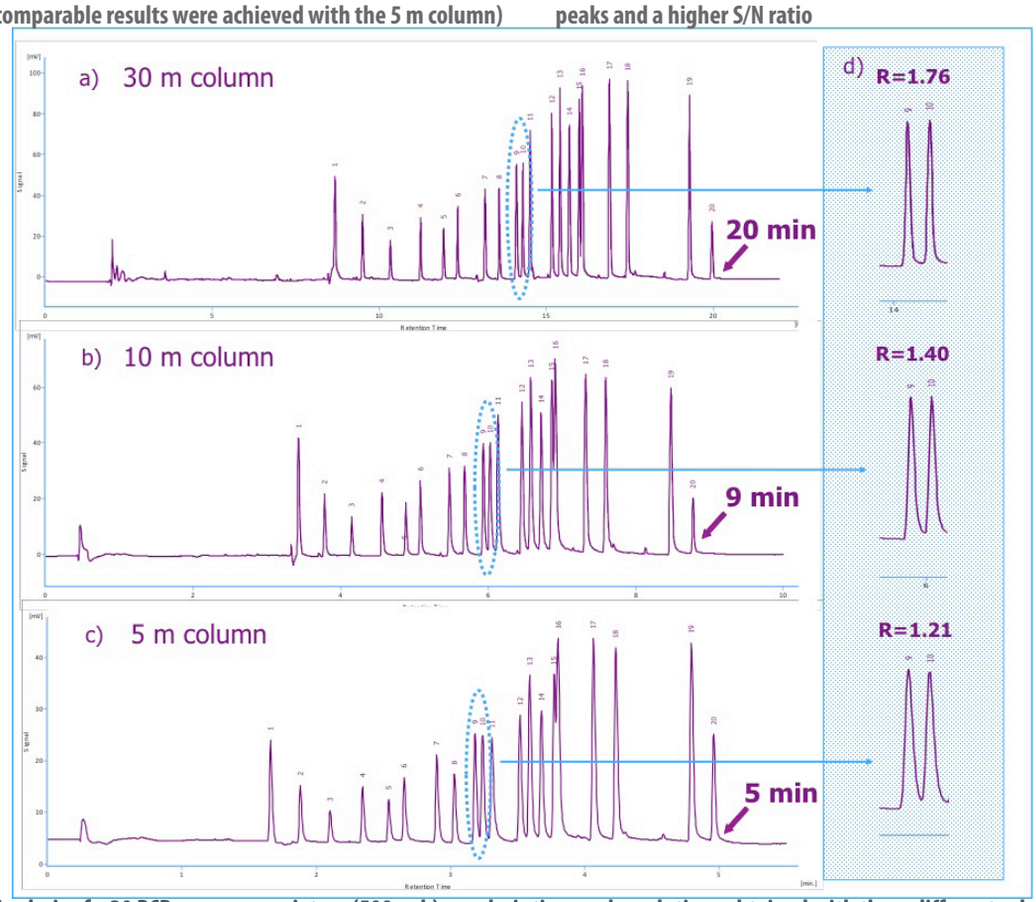
Repeatability, LOD and LOQ calculated for each target compound were obtained with the 10 m column (comparable results were achieved with the 5 m column)

CONVENTIONAL GC
30 m x 0.25 mm column
acq. rate 25 Hz

FAST GC
10 m x 0.1 mm column
acq. rate 100 Hz



Peak width and S/N comparison : Fast GC provides narrower peaks peaks and a higher S/N ratio



Analysis of a 20 PCB congeners mixture (500 ppb): analysis time and resolutions obtained with three different columns

WATER ANALYSIS

Fuel Oxygenates in Water
Application Note AN 122

Fuel oxygenates, primarily ethers and alcohols, are added to gasoline to enhance the octane content and to improve air quality reducing the emission of pollutants, particularly carbon monoxide.
Fuel oxygenates can be found in aquifers as contaminants. Their introduction to the environment can be accidental through the release from underground pipelines, tanks and gasoline spills. Industrial wastewater as well as the petroleum fuel cycle process can also represent sources of oxygenates to the water.
The proof of the presence of oxygenates in drinking water has raised serious concern regarding the taste and odor aspects. Concerns also raised about possible human-health implications.
In the following application INCREASED ANALYTICAL PERFORMANCES and HIGH RELIABILITY are obtained through the use of the Master GC coupled to the Master DHS/P&T.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-122 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Fuel Oxygenates in Water.

Master DWA-122

INCREASED ANALYTICAL PERFORMANCES

Master DHS/P&T incorporates the innovative and ingenious Dew Stop device which efficiently removes water regardless of the analytes, maintaining volatile compounds recovery unaffected.

HIGH RELIABILITY

The minimal sample handling required by the system, along with the complete automation of all process steps, ensures highly reliable and reproducible results minimizing operators errors.

Analysis Conditions

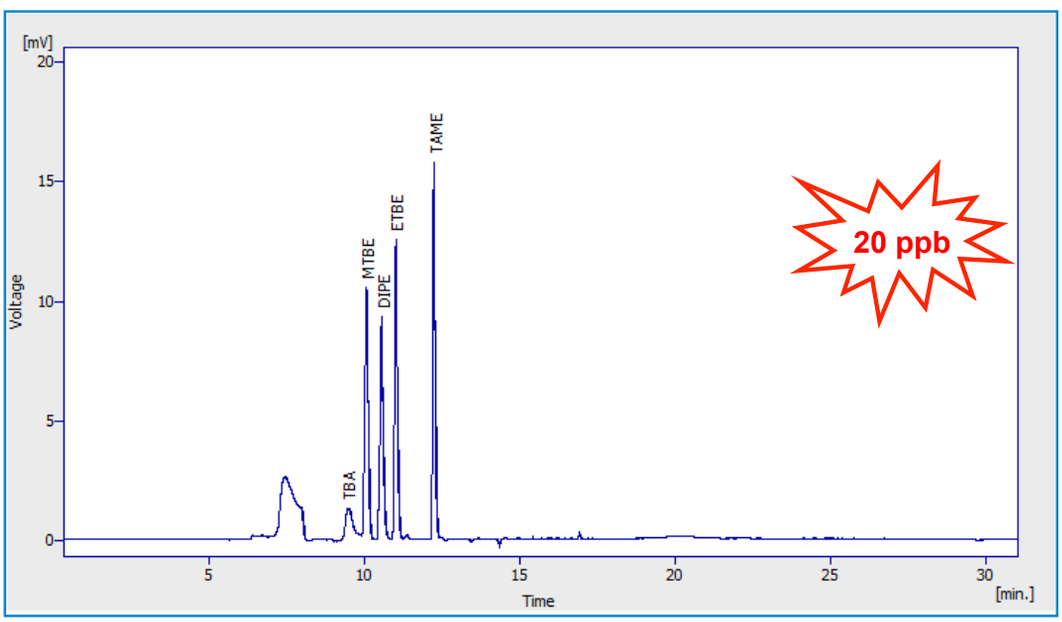
Master GC Parameters:

Oven	35°C , 6°C/min., 90°C , 45°C/min., 210°C (15 min.)
Detector	FID 250°C
Injector	SL/IN 200°C
Carrier	Helium, 1.2 mL/min., (split 1:20)
Column	Vocol 60 m x 0.25 mm i.d. x 1.5 µm d_f

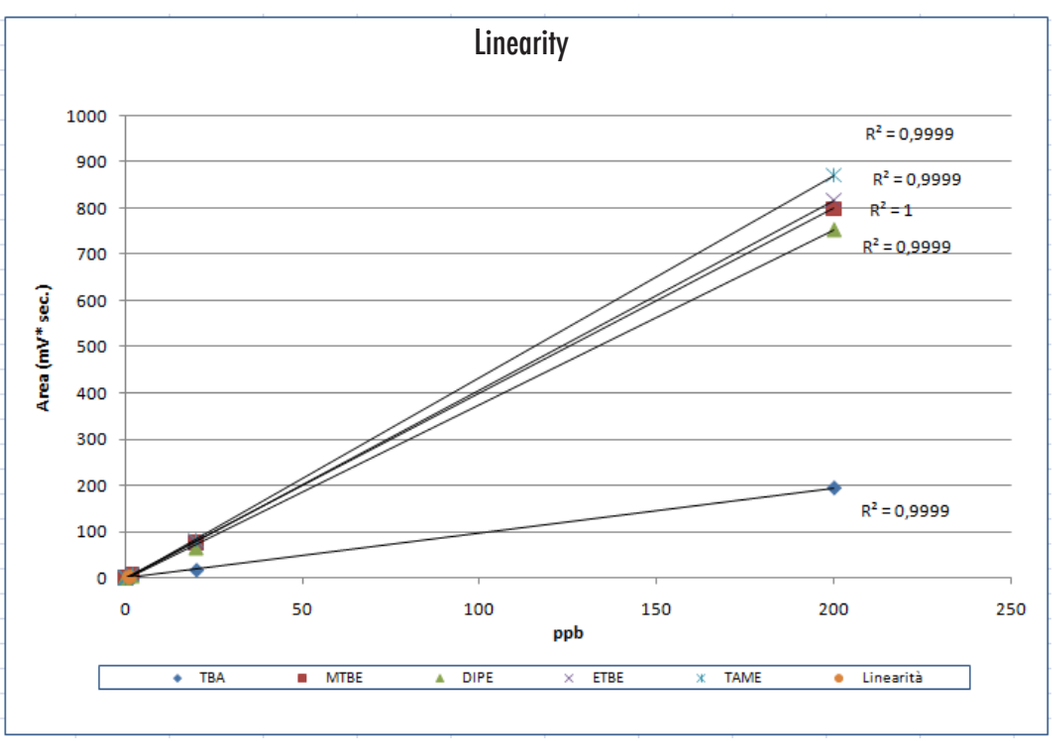
Master DHS/P&T Parameters - Purging Mode

Incubation	0.5 min., 60°C, Shaking Fast
Stripping	11 min., 40 mL/min., Trap 0°C
Injection	2 min., Dew Stop 0°C, Trap 300°C
Baking	5 min., 150 mL/min. Trap 310°C, Dew Stop 200°C
Transfer Line	170°C
Switching Valve	170°C
Trap Material	Carbopack B/Carboxen 1000
Sample Volume	10mL

Fuel Oxygenates in Water



Chromatogram of a standard solution



System linearity calculated in a range from 0.02 to 200 ppb

WATER ANALYSIS

Hydrocarbon Oil Index in Water
ISO 9377-2 method
Application Note AN 123

The determination of the Hydrocarbon Oil Index is mandatory for the environment and human health protection.
The ISO 9377-2 is the official European method for oil and grease determination in water. This test is a gas chromatographic method suitable for surface water, wastewater and water from sewage treatment.
The goal of the following application is to show a system configuration to fulfill the requirements of the method EASILY and IN A VERY SHORT TIME. Fast GC analysis is demonstrated to be A RELIABLE, PROVEN AND AUTOMATED TECHNIQUE able to IMPROVE LABORATORY PRODUCTIVITY. This is why the proposed system configuration is the perfect solution for those laboratories that are constantly faced with the need to maximize sample throughput without sacrificing the accuracy of the results.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Water Analyzer DWA-123 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of the Hydrocarbon Oil Index in Water.

Master DWA-123

RELIABLE, PROVEN AND AUTOMATED TECHNIQUE

The Master GC, uniquelly designed to perform both conventional and fast gas chromatographic analyses, deliver unsurpassed analytical capabilities. Moreover, unlike other commercially available fast gas chromatographs, the Master GC offers guided diagnostic and maintenance procedures supporting the user in the preservation of the system precision.

IMPROVED LABORATORY PRODUCTIVITY

Fast analysis time, fast results and the consequent reduction of the cost per analysis are the driving factors for every environmental laboratory.

COMPLIANT WITH ISO 9377-2 METHOD

The proposed configuration fulfills all the requirements of the method.

Analysis Conditions

Master GC Parameters:

Oven	125°C, 70°C/min., 175°C, 50°C/min., 300°C, 35°C/min., 350°C (1 min.)
Detector	FID 380°C
Injector	PTV 100°C, 999°C/min., 380°C (2 min.)
Split Flow	1:30
Carrier	He 1,89 bar
Column	DN-5 FAST 5 m x 0,1 mm i.d. x 0,1 µm d_f
Sample Volume	1 µL

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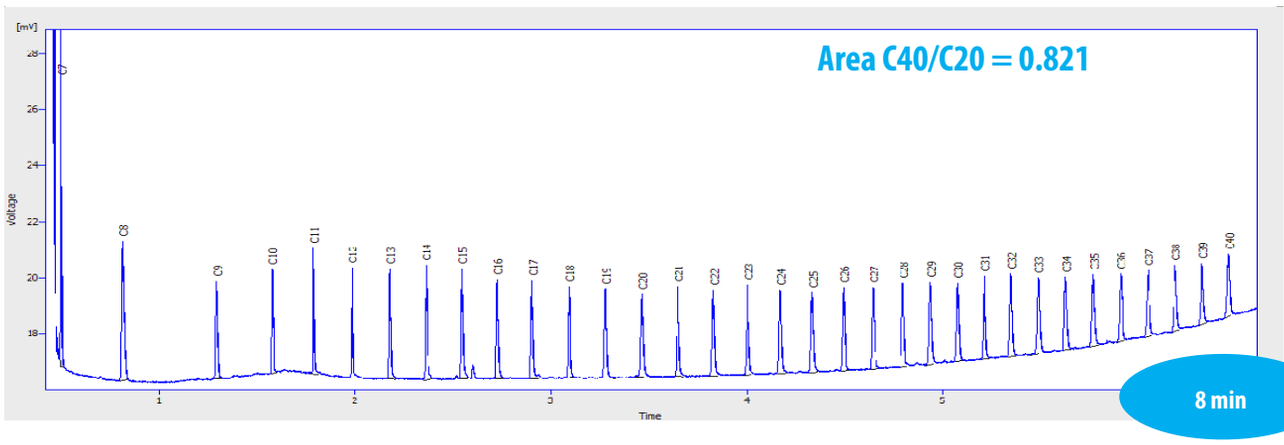
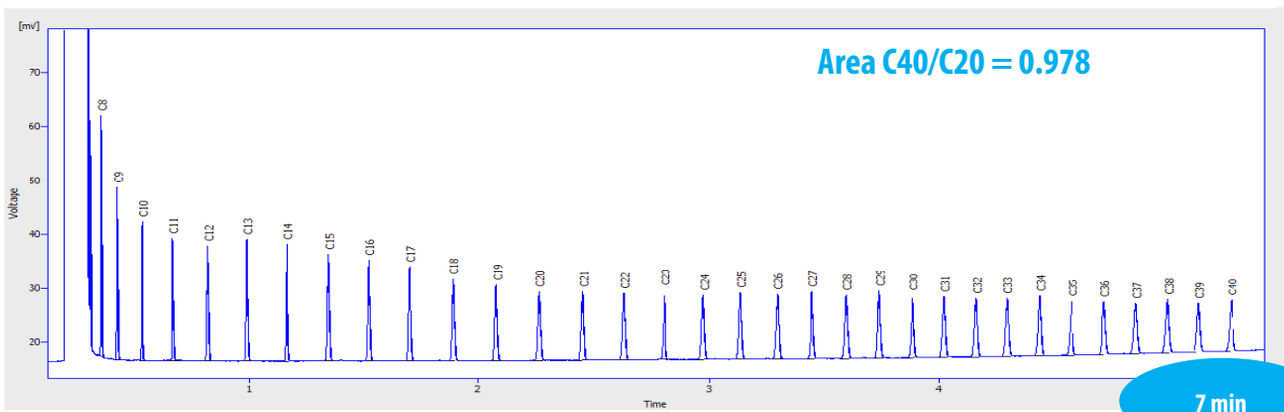
Hydrocarbon Oil Index in Water
ISO 9377-2 method

Alkanes C7 - C40



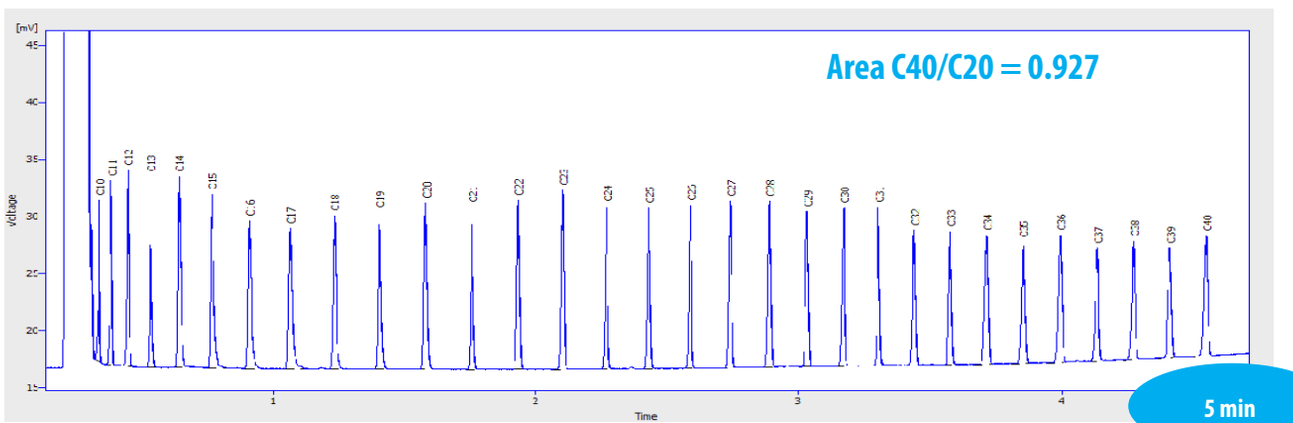
8 min

Alkanes C8 - C40



7 min

Alkanes C10 - C40



5 min

WATER ANALYSIS

Determination of Phtalates
Application Note AN 052

Phtalate esters are contaminants mainly used in a large variety of products such as children toys, entering coatings of pharmaceutical pills, cosmetics, detergents, film formers and, more generally, plastic products. Recent studies link phtalates to different human deseases, from disruption for the endocrine system to cancer.
Phtalates are easily released into the environment due to the plastic breakdown and aging. Due to their massive presence in the environment, phtalates are also commonly found in groundwater.
Direct or indirect exposure to these compounds may cause health deseases. Phtalates can be found almost everywhere; for this reason EPA has developed the method 606 in order to quantify them. EPA Method 606 is a gas chromatographic method applicable to the determination of phtalate esters in municipal and industrial discharges.
The application below shows a SIMPLE and RELIABLE solution for the analysis of Phtalates.

SIMPLE AND RELIABLE DETERMINATION OF PHTALATES

Unparalleled and reliable chromatographic accuracy and precision are guaranteed by the patented Digital Flow Control. All the parameters can be easily set up and controlled by an intuitive touchscreen.

ONLY 10 MINUTES ANALYSIS TIME

Tha short analysis run times and higher performances of the Master GC significantly reduce laboratory operating costs.

Analysis Conditions

Master GC Parameters:

Oven	150°C - 15°C/min - 270°C
Detector	FID 300°C
Injector	SL/IN 250°C
Injection Mode	Splitless
Carrier	He 20 ml/min
Column	DN-1 15m x 0,53mm i.d. x 1,50µm d_f
Sample Volume	1.0 µL

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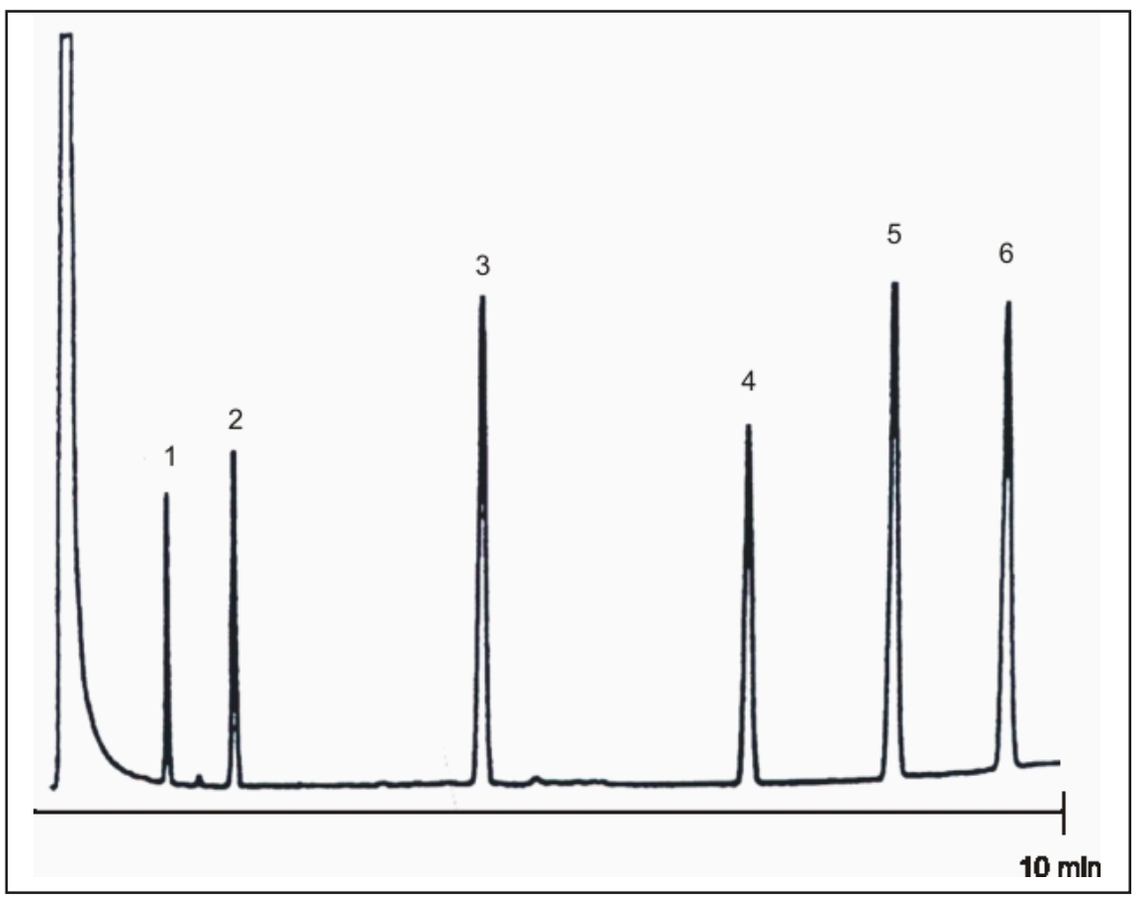
A Scent Of Future

Determination of Phtalates
EPA Method 606



Peak Identification	
1	Dimethyl-phthalate
2	Diethyl-phthalate
3	Di-n-butyl phthalate
4	Butyl benzyl phthalate
5	Bis (2-ethylhexyl) phthalate
6	Di-n-octyl phthalate

WATER ANALYSIS

Determination of Haloethers
EPA Method 611/8111
Application Note AN 069

In the perspective of a study about all identificable effects on health and welfare which may be expected from the presence of pollutants in any body of water, including ground water, a special attention is reserved to haloethers.
Haloethers are pollutant compounds mostly manufactured and they are used as solvents, chemical intermediates, soil fumigants, pesticides, fungicides, etc. Moreover, haloethers are characterized by their persistence in natural surface waters and can be adsorbed by organic-rich sediments and bioaccumulated in fish.
For the above-mentioned reasons haloethers are under investigation as a possible cause for different types of human deseases.
EPA method 8111 provides gas chromatographic conditions for the detection of ppb concentration of haloethers in water and soil or ppm concentration in waste samples.
METHOD REQUIREMENTS ARE ACHIEVED in the following analysis with MAXIMUM PRECISION AND ACCURACY.

MAXIMUM PRECISION

The patented DFC - Digital Flow Control automatically adjusts the carrier gas flow to compensate the ambient temperature and pressure providing constant retention time, enhanced repeatability and extreme precision.

EXTREMELY FLEXIBLE SYSTEM

The advanced modular design of the Master GC components features outstanding flexibility and upgradeability. Any GC configuration can be easily modified and/or upgraded.

UNPARALLELED CHROMATOGRAPHIC ACCURACY

The patented DFC and the optimal control of the oven temperature assure outstanding retention time repeatability, unprecedented for all chromatographic measurements.

Analysis Conditions

Master GC Parameters:

Master GC Oven	100°C - 15°C/min - 300°C
Detector	FID 300°C
Injector	SL/IN 250°C
Split Ratio	1:50
Carrier	He 2,90 psi
Column	DN-5 15m x 0,53mm i.d x 1,50µm d_f
Sample Volume	0.2 µL

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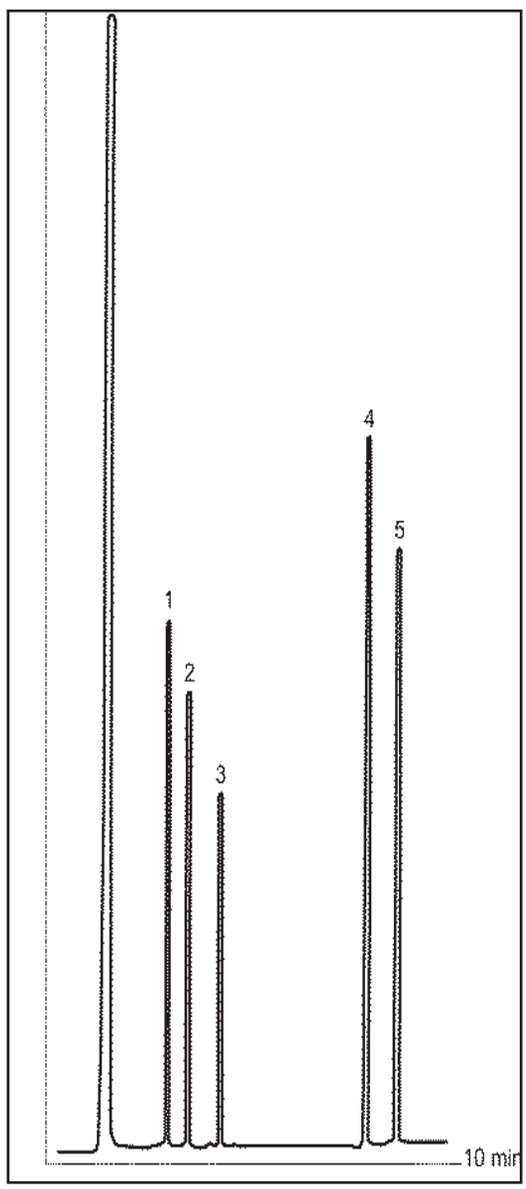
Determination of Haloethers
EPA Method 611/8111



Peak identification	
1	*bis*(2-chloroethyl) ether
2	*bis*(2-chloroisopropyl) ether
3	*bis*(2-chloroethoxy)methane
4	4-chlorophenylphenyl ether
5	4-bromophenyl phenyl ether

WATER ANALYSIS

Determination of Nitrosamines
EPA Method 607
Application Note AN 067

Nitrosamines are a family of compounds used in the manufacture of rubber, cosmetics, pesticides, leather, etc. They can be also found in tobacco, cured meats, and beer.
Thanks to the massive studies involving Nitrosamines, it has been demonstrated that these compounds are mutagens and carcinogens. In regard to this, US Environmental Protection Agency and worldwide environmental and health related government agencies have imposed restrictions on the use of these substances. It is therefore essential to be able to count on a reliable and accurate solution that ensures EXCELLENT RESULTS IN TERMS OF REPRODUCIBILITY AND PEAK SEPARATION.
EPA Method 607 is a gas chromatographic method applicable to the determination of certain nitrosamines in municipal and industrial discharges. The following work shows excellent results that MATCH THE REQUIREMENTS OF THE METHOD.

EXCELLENT RESULTS IN TERMS OF REPRODUCIBILITY AND PEAK SEPARATION

The column combined with the fast GC oven temperature generates sharper peaks. The proprietary PTV Injector achieves extremely fast heating rates and rapid cool down with ambient air. After injection, the PTV can be programmed to decrease the split flow and save carrier gas. The DFC, in addition, adjusts the carrier gas flow providing ambient temperature and pressure compensation. These features provide constant retention time and unmatched reproducibility.

RESULTS MEETING EPA METHOD REQUIREMENTS

The proposed configuration provides reliable and repeatible results in compliance with the EPA method 607.

Analysis Conditions

Master GC Parameters:

Oven	40°C - 20°C/min - 240°C
Detector	FID 280°C
Injector	PTV 50°C, 600°C/min, 240°C
Carrier	H2 10 ml/min
Column	DN-5 15m x 0,53mm i.d x 1,50 µm d_f
Sample Volume	1.0 µL

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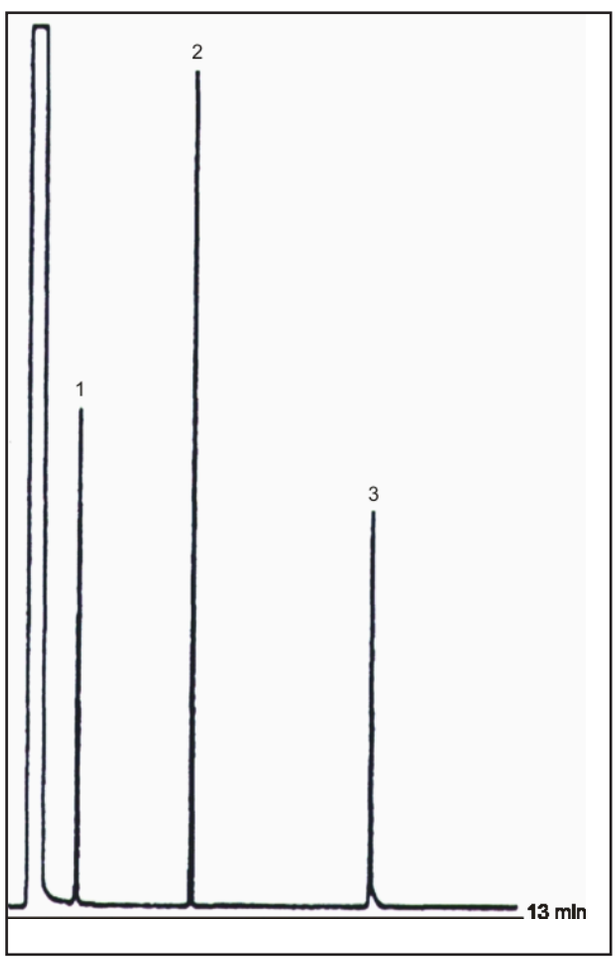
Determination of Nitrosamines
EPA Method 607



Peak identification	
1	*n*-nitrosodimethylamine
2	*n*-nitrosodi-n-propylamine
3	*n*-nitrosodiphenylamine

WATER ANALYSIS

Determination of Phenols and Chlorophenols
EPA Method 604
Application Note AN 066

Phenols exist in the environment as products of the chemical, petrol, tinctural and pharmaceutical industries and as a consequence of a number of pesticides and the generation of industrial sewages.
Phenols are one of the first compounds reported into the List of Priority Pollutants by the US Environmental Protection Agency for their toxicity.
EPA Method 604 is a flame ionization detector gas chromatographic (FIDGC) method for the determination of phenols and certain substituted phenols in municipal and industrial discharges.
The analysis here below shows the easy ACHIEVEMENT OF THE EPA METHOD REQUIREMENTS, thanks to a FLEXIBLE SYSTEM, SIMPLE TO SET UP AND TO CONTROL.

FLEXIBILITY

The advanced modular design of the Master GC components features outstanding flexibility and upgradeability. Any GC configuration can be easily modified or upgraded. The Master GC allows the assembly of up to three injector and three detectors simultaneously.

QUICK AND EASY SET UP

The Master GC incorporates an intuitive and easy-to-use touchscreen interface that provides quick and easy set up and control. The system can also be controlled by the functional and user-friendly CLARITY ™ Chromatography Station.

COMPLIANCE WITH REGULATORY NORMS

The proposed configuration provides reliable and repeatible results in compliance with the EPA method 604.

Analysis Conditions

Master GC Parameters:

Oven	110°C - 8°C/min - 280°C
Detector	FID 300°C
Injector	SL/IN 300°C
Carrier	H_2 8,70 psi
Split Flow	1:100
Column	DN-5 25m x 0.32mm i.d. x 1,00 µm d_f
Volume Injected	1.0 µL

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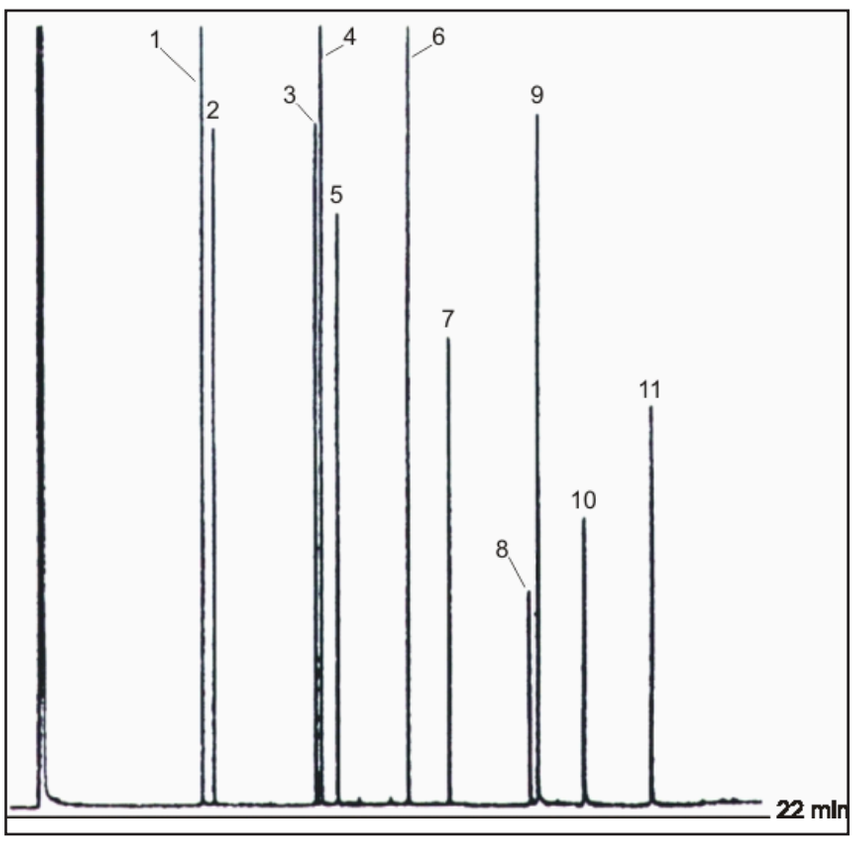
Determination of Phenols and Chlorophenols
EPA Method 604



Peak identification			
1	phenol	7	2,4,6-trichlorophenol
2	2-chlorophenol	8	2,4-dinitrophenol
3	2-nitrophenol	9	4-nitrophenol
4	2,4-dimethylphenol	10	2-methyl-4,6-ditrophenol
5	2,4-dichlorophenol	11	pentachlorophenol
6	4-chloro-3-methylphenol		

WATER ANALYSIS

Determination of Organochlorinated Pesticides
EPA Method 608/8081
Application Note AN 063

Organochlorinated pesticides have a long history of widespread use and are persistent organic pollutants. Traces of these pesticides can still be found in the environment in the top layer soils after more than twenty years they have been banned. They have significant toxicity to plants, animals and humans, accumulating in food chains. It is therefore importan to rely on an **ACCURATE CHROMATOGRAPHIC SEPARATION** and to obtain an **EXACT QUANTIFICATION** easily even in complex matrices.
EPA Method 608 is a gas chromatographic (GC) method applicable to the determination of certain organochlorinated pesticides and PCBs in municipal and industrial wastes.
EPA Method 8081 is used to determine the concentrations of various organochlorinated pesticides in extracts from solid and liquid matrices.
The **REQUIREMENTS OF BOTH METHODS ARE ACHIEVED** in the following analysis.

ACCURATE SEPARATION FOR PESTICIDES WITHOUT RISK OF DISCRIMINATION AND DEGRADATION

Unique characteristics of DANI PTV : the sample is introduced by cold injection followed by vaporization eliminating possible discrimination or degradation.

EASY QUANTIFICATION OF ORGANOCHLORINATED PESTICIDES

Selective Detector (ECD) offers excellent performances in the determination of pesticides. The sensitivity of the ECD enables it to provide unmatched performances for tough applications.

COMPLIANT WITH EPA METHODS 608/8081

The proposed configuration provides reliable and repeatible results in compliance with the EPA method 608/8081.

Analysis Conditions

Master GC Parameters:

Oven	65°C - 20°C/min - 150°C - 7°C/min - 260°C
Detector	ECD 280°C
Injector	PTV 50°C, 600°C/min, 260°C
Carrier	H_2 8,70 psi
Column	DN-5 25m x 0,32mm i.d. x 0,25 µm d_f
Sample Volume	1.0 µL

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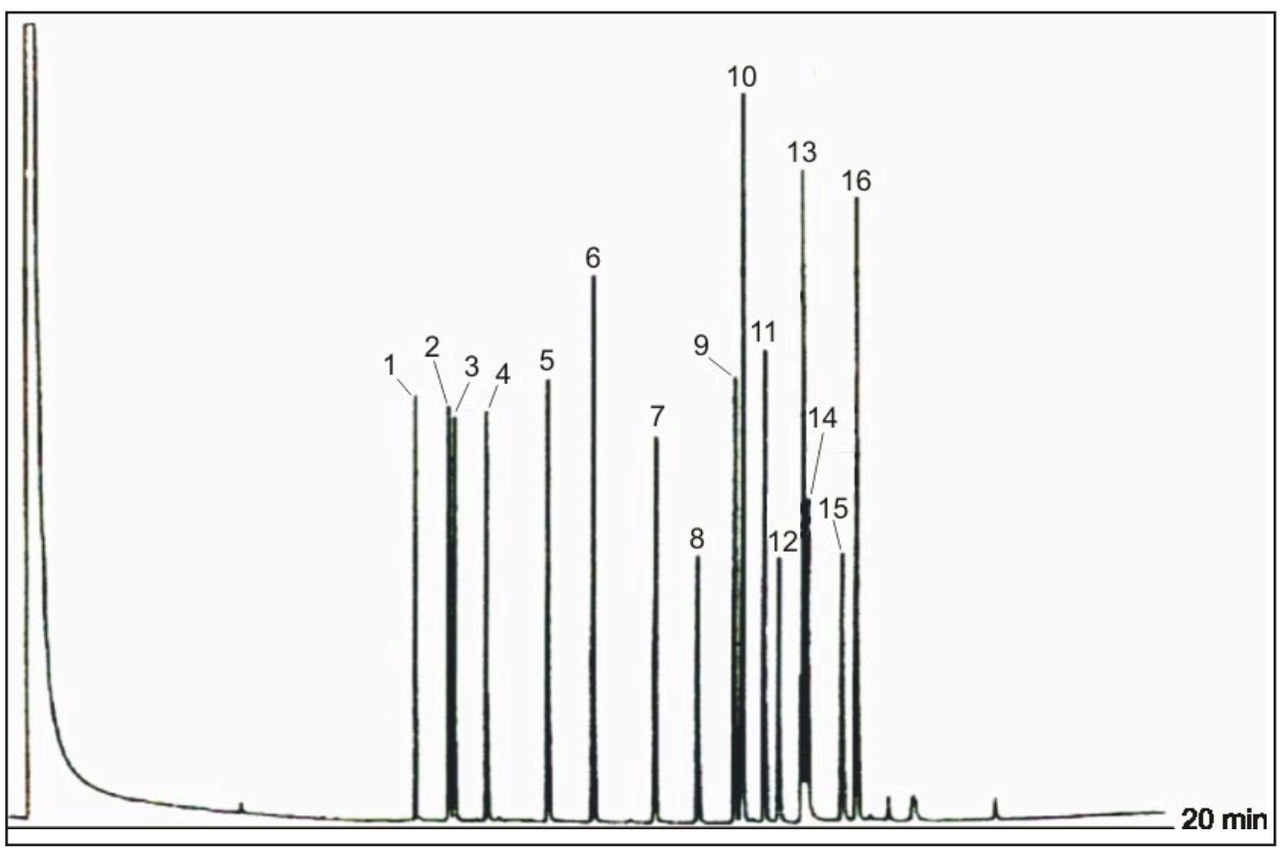
Determination of Organichlorinated Pesticides
EPA Method 608/8081



Peak identification			
1	α - BHC	9	4,4′ DDE
2	β - BHC	10	dieldrin
3	γ - BHC	11	endrin
4	δ - BHC	12	4.4′ DDD
5	heptachlor	13	endosulfan II
6	aldrin	14	endrin aldehyde
7	heptachlor epoxide	15	4,4′ DDT
8	endosulfan I	16	endosulfan sulfate

WATER ANALYSIS

Determination of Organophosphorus Pesticides
Application Note AN 095

Organophosphorus Pesticides are among the most widely used class of pesticides thanks to their high efficacy against pests. They are also well known for their poisoning effects on human health as the over-exposure to organophosphorus pesticides may cause irreversible damage to the nervous system and have neurotoxic effects on developing organisms. They can be, in fact, absorbed by inhalation, ingestion, and dermal absorption.
These compounds represent a concrete risk for the environment, also. Industrial waste, seepage from buried toxic wastes, and contamination during spraying operations, they all can be considered as possible ways for their introduction into the water.
EPA Method 622 is a gaschromatographic (GC) method appliable to the determination of certain organophosphorus pesticides in industrial and municipal discharges as provided under 40 CFR 136.1.
The analysis below is an example, applicable to complex mixtures, that shows how to **REACH THE METHOD DETECTION LIMITS**. These **OUTSTANDING RESULTS** can be achieved thanks to an **INCREASED PEAK RESOLUTION** and the use of a particularly selective and sensitive detector.

INCREASED PEAK RESOLUTION

The column (DN-68) is dedicated to the analysis of phosphorus pesticides and generates sharper peaks which result in higher signal and greater signal-to-noise ratios.

OUTSTANDING RESULTS IN TERMS OF S/N RATIO EVEN FOR NOT COMPLETELY PURIFIED SAMPLES

The Flame Photometric Detector selectively detects compounds containing sulfur or phosphorus. It is the detector of choice for the detection of phosphorus pesticides by virtue of its selectivity and sensitivity.

THE CONFIGURATION MATCHES THE EPA METHOD 622

The proposed configuration provides reliable and repeatible results in compliance with the EPA method 622.

Analysis Conditions

Master GC Parameters:

Master GC Oven	100°C (1 min) - 5.5°C/min - 230°C - 30°C/min - 270°C
Detector	FPD 140°C
Injector	SL/IN 270°C
Injection Mode	Splitless
Carrier	H_2 10,15 psi
Column	DN-68 25m x 0.32mm i.d. x 0.25 µm d_f
Sample Volume	1.0 µL

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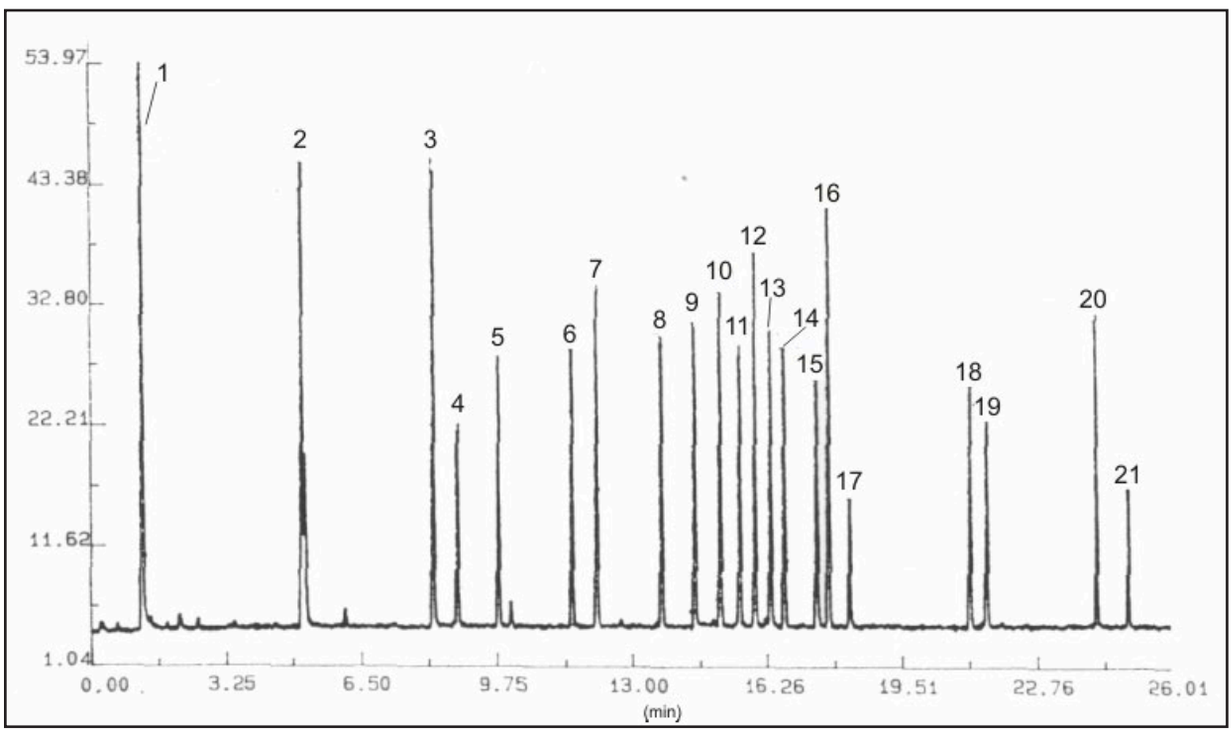
Determination of Organophosphorus Pesticides



Peak identification			
1	Trichlorfon	2	Phosdrin
3	Tionazine	4	Ethoprophos
5	Phorate	6	Phonophos
7	Diazinone	8	CH3-Chlorpyriphos
9	CH3-Parathion	10	CH3-Pirimiphos
11	Chlorpyriphos	12	Malathion
13	Parathion	14	Pirimiphos
15	Quinalphos	16	C2H5-Bromophos
17	Metidathion	18	Ethion
19	Trithion	20	CH3-Azinphos
21	C2H5-Azinphos		

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“Air pollution is a major environmental risk to health. By reducing air pollution levels, we can help countries reduce global burden of desease from respiratory infections, heart desease and lung cancer.

Source: Air Quality and Health - World Health Organization ”

AIR ANALYSIS

The activities of human society all affect the environment. All stages of these activities contribute directly or indirectly to air pollution. Air quality is a worldwide concern and monitoring is essential to estimate impacts on and risks to human health and the environment.
The choice of the most appropriate, simplest and most convenient technique is essential to obtain the necessary data that can provide the basis for developing policies and strategies, setting objectives, assessing compliance with targets and planning enforcement actions.
In the following pages a number of solutions that allow to achieve these objectives are presented.
DANI has continued to implement innovative techniques by introducing in the market very reliable, extremely versatile and easy to use instruments that meet air monitoring real requirements.
Decades of experience in developing applications for the Environmental industry are the basis of the Master DAA Dani Air Analyzers.

AIR ANALYSIS

“Time is Money.”

Benjamin Franklin

Time is always a key factor in today’s laboratories productivity.

Master your Time with the Master DANI Air Analyzers.

The ability to provide the proper configuration to meet the most challenging analytical demands comes from a long and proven experience and a deep industry knowledge. As requirements are constantly changing, even a highly reliable instrumentation could not be enough to succeed in getting trustworthy results: complete and guaranteed solutions are essential to comply with the latest industry standards and specifications.
After a long working relationship with its customers to know and to best match their real needs, DANI Instruments has developed key analytical solutions that cover a broad array of applications, requirements and protocols in the environmental industry.
Master DANI Air Analyzers are **PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS** specifically designed for peculiar analyses. The analyzers include the **HARDWARE**, the **SOFTWARE**, **COLUMNS AND CONSUMABLES**, the **OPTIMIZED ANALYSIS METHOD**, the **ANALYTICAL CONDITIONS**, and the **DOCUMENTATION** to run up your analysis from day one.

PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS

The installation process is faster than ever before and all the startup procedure is oversimplified ensuring immediate analytical performance and results.

HARDWARE AND SOFTWARE

DAA Analyzers are pre-engineered systems based on the versatility, flexibility and robustness of the proven Master GC hardware. All the Master GC parameters are set prior the shipment.

COLUMNS AND CONSUMABLES

No more doubts about the proper column, parts and supplies. DAA Analyzers are delivered with all you may need for your analysis.*

OPTIMIZED ANALYSIS METHOD

Analytical methods are pre-loaded to be immediately used for the determination of pollutants in air. Whenever possible, reduction of analysis time and amounts of toxic solvents are considered. Method development time and costs are thus dramatically reduced.

ANALYTICAL CONDITIONS

DAA Analyzers are designed to perfectly accomplish the analytical conditions of interest.

DOCUMENTATION

A getting started manual, calibration and method files, and all the information for a quick startup are included .

View your Analyzer:

- Master DAA-050 BTEX in Ambient Air Analyzer
- Master DAA-048 Volatile Chlorinated Hydrocarbons in Air Analyzer
- Master DAA-124 VCM Workplace Air Monitoring Analyzer
- Master DAA-125 Trace Analysis of Freons Analyzer
- Master DAA-030 Ozone Precursors in Air Analyzer
- Master DAA-021 VOC Pollutants in Air Analyzer
- Master DAA-126 Glycol Ethers Analyzer

* Chemicals are not supplied

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Master GC
Fast Gas Chromatograph

High Productivity
Accuracy and Precision
Flexibility and Upgradeability
User Friendly Interface

The versatile and flexible Master GC delivers unsurpassed analytical capabilities meeting today's laboratories productivity requirements. The GC was uniquely designed to perform conventional and fast gas chromatographic analyses.
The primary goal of Fast GC is to maintain proper resolving power in shorter analysis run times by using adequate instrumentation and analytical columns in combination with optimized method parameters. The Master GC features a maximum heating rate up to 140° C/min and a typical cooling time of 4 min. In addition, DANI offers a variety of detectors engineered with fast electronics to handle sharp peaks; data acquisition rates of up to 300 Hz are performed.

Master TOF
Time of Flight GC/MS

Extremely Compact Design
High Productivity
Powerful Software Solution
Walkaway Automation

The Master TOF-MS detector performs the fastest acquisition rates (1000 spectra/s) and the widest linear dynamic range (10^5) available on the market. These capabilities are offered in an extremely compact bench-top instrument. In combination with the Master GC, the system is the ideal solution for Fast GC and GCxGC laboratories.
The Master LAB Software offers the proper tool for the reliable control of the system, from autotuning procedures to GC and sample sequence management. An original deconvolution algorithm capable to handle a large amount of information in a smart and effective way provides trustworthy identification of trace compounds even in complex matrices.

Master SHS
Static Headspace Sampler

A Robust and Flexible System to Meet Complex and Versatile Needs

The Master SHS delivers the highest performances to overcome daily new challenges and supplies trustworthy and enhanced results. The highest sample capacity and the unlimited priority sample position provide straightforward results for virtually any analytical need in real time. The Valve&Loop Technique, the known and fixed volume of the sample, the accurate temperature control and the entirely chemically inert sample flow path guarantee outstanding repeatability and avoid the risk of false results, sample loss or recondensation.

Master DHS/P&T
Dynamic Headspace and Purge&Trap Sampler

A Dynamic Approach to High Sensitivity Headspace Analysis

The Master DHS/P&T provides the most versatile, state-of-the-art system for headspace analysis featuring the capabilities of a Purge&Trap system. It combines the high sensitivity of the Dynamic Headspace technique with the productivity, ease of use, and flexibility of a completely automated solution.
The Master DHS/P&T offers up to a 100-fold increase in sensitivity over conventional headspace techniques and assures detection limits beyond capability of SPME.

Master TD
Thermal Desorber

The Ultimate Solution for High Sensitivity Detection of Volatiles

The Master TD offers superior sensitivity, versatility, and productivity for the extraction of volatile and semi-volatile compounds from air and solid matrices. The excellent analytical performances of the system is guaranteed by the two-stage thermal desorption process and supported by the patented "Instant Desorption" of the trap. This design assures the complete transfer of the analytes and their injection into the analytical column in a narrow band to preserve chromatographic resolution and accuracy. The fully automated control of the system provides high sample capacity and optimal sampling tube processing for maximum system productivity.

AIR ANALYSIS

TABLE OF CONTENTS

BTEX

benzene
toluene
ethylbenzene
p-xylene
m-xylene
o-xylene

EPA Method TO-17

Application Note AN 050
BTEX in Ambient Air by Thermal Desorption

Master DAA-050
BTEX in Ambient Air Analyzer

Volatile Chlorinated Hydrocarbons

methylene chloride
trans-1,2-dichloroethane
1,1-dichloroethane
chloroform
1,1,1-trichloroethane
1,2-dichloroethane
carbon tetrachloride
trichloroethylene
bromodichloromethane
dibromochloromethane
tetrachloroethylene
bromoform

EPA Method TO-17

Application Note AN 048
Analysis of Volatile Chlorinated Hydrocarbons in Air

Master DAA-048
Volatile Chlorinated Hydrocarbons in Air Analyzer

VCM

vinyl chloride monomer

Application Note AN 124
VCM Workplace Air Monitoring by Thermal Desorption

Master DAA-124
VCM Workplace Air Monitoring Analyzer

Freons

freon 11
freon 113
methylene chloride
*trans*1,2-dichloroethane
chloroform
1,1,1-trichloroethane
1,2-dichloroethane
carbon tetrafloride
trichloroethylene
bromodichloromethane
dibromodichloromethane
tetrachloroethylene
bromoform

Application Note AN 125
Trace Analysis of Freons

Master DAA-125
Freons in Air Analyzer

Ozone Precursors

benzene
ciclohexane
2,3-dimethylpentane
2,4-dimethylpentane
2,2,4-trimethylpentane
methyl-cyclopentane
2,3,4-trimethylpentane
toluene
2-methylheptane
3-methylheptane
n-octane
ethylbenzene
m-xylene
o-xylene
n-nonane
a-pinene
β-pinene
1,2,4-trimethylbenzene
ethane
ethene
propane
cyclopropane
propylene
isobutane
acetylene
n-butane
propadiene
2,2-dimethylbutane
trans-2-butene
1-butene
iso-butylene
cis-2-butene
cyclopentane
isopentane
pentane
propyne
1,3-butadiene
3-methyl-1-butene
2-methyl-1-butene
cyclopentene
1-pentene
trans-2-pentene
cis-2-pentene
2-methylpentane
3-methylpentane
2-methyl-1-pentene
4-methyl-1-pentene
cis-2-hexene
trans-2-hexene
isoprene
hexane
3-methylhexane

EPA Method TO-14

Application Note AN 030
Monitoring of Ozone Precursors in Air with an On-line Sampling System

Master DAA-030
Ozone Precursors in Air Analyzer

DANI
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Aromatic VOC Pollutants

benzene
toluene
ethylbenzene
p-m-xylene
o-xylene

EPA Method TO-14

Application Note AN 021
On-line Collection and Analysis of Aromatic VOCs in Air

Master DAA-021
Aromatic VOCs in Air Analyzer

Glycol Ethers

EGME
EGEE
EGEEA
EGBE
TeGDME

Application Note AN 126
Determination of Glycol Ethers

Master DAA-126
Glycol Ethers in Air Analyzer

Phenols

phenol
2-chlorophenol
2-nitrophenol
2,4-dichlorophenol
4-chloro-3-methylphenol

2,4,6,trichlorophenol
2,4-dinitrophenol
4-nitrophenol
2-methyl-4,6-dinitrophenol
pentachlorophenol

Application Note AN 017
Determination of Phenols

AIR ANALYSIS

BTEX in Ambient Air by Thermal Desorption

Application Note AN 050

BTEX (Benzene, Toluene, Ethylbenzene and Xylenes) are volatile aromatic hydrocarbons found in petroleum derivates such as motor vehicle fuel. Once released to the environment, BTEX compounds usually evaporate quickly into the air. They are hazardous chemicals and their presence in ambient air has been the subject of great concern in many studies. The primary exposure to BTEX, in fact, is from breathing air contaminated by motor vehicles emissions, industrial use and cigarette smoke.
Due to the presence of a large amount of BTEX in ambient air at very low concentration (tipically from low ppb to high ppt), a preconcentration step followed by high-resolution gas chromatographic analysis is required to obtain enough SENSITIVITY AND RESOLUTION. Furthermore, the use of sorbent tubes provides an ECONOMICAL AND VERSATILE SOLUTION for concentrating apolar and polar volatile organics from air sample.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI AirAnalyzer DAA-050 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of BTEX in Ambient Air.

Master DAA-050

HIGH SENSITIVITY AND RESOLUTION

Two-stage thermal desorption
Patented "Instant Desorption" for the instantaneous heating of the trap

ECONOMICAL AND VERSATILE SOLUTION

The high temperature range (50-300°) of the valve and the transfer line assures good results for reactive compounds and avoid cold spots in the sample pathway. Master TD is the only TD on the market able to cover the widest range without changing hardware and without compromises.

Analysis Conditions

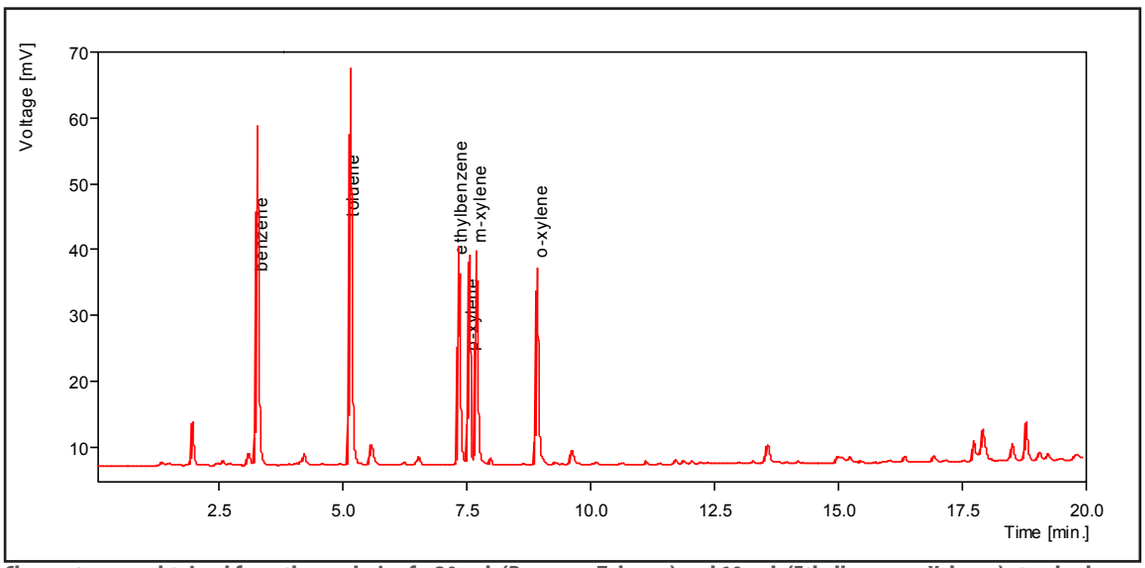
Master GC Parameters:

Oven	35°C (5 min), 5°C/min, 200 °C
Detector	FID, 250 °C
Injector	SL/IN 80 °C
Split Flow	5 mL/min
Carrier	He 1.5 mL/min
Column	Carbowax 20M 30 m x 0.25 mm i.d. x 0.25 µm d_f

Master TD Parameters:

Trap	Tenax GR
Trap Temp.	adsorption 25°C, desorption 300°C (3 min)
Tube	Tenax GR
Tube Desorber Temp.	300°C for (5 min) He 30 mL/min.

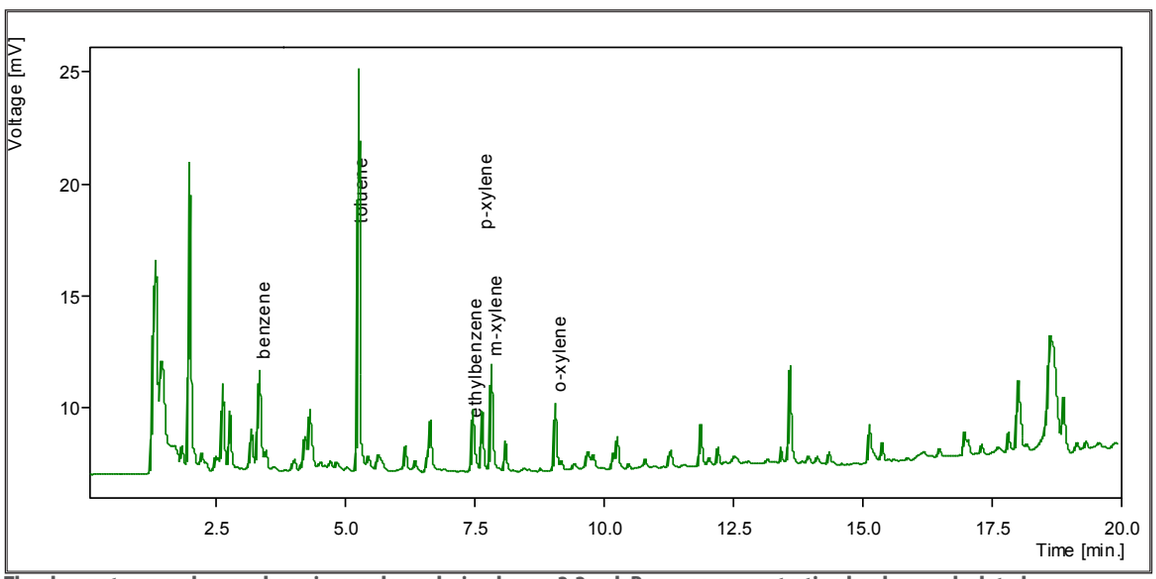
BTEX in Ambient Air by Thermal Desorption



Chromatogram obtained from the analysis of a 20 ppb (Benzene, Toluene) and 10 ppb (Ethylbenzene, Xylenes) standard mixtures.

	Benzene	Toluene	Ethylbenzene	p-Xylene	m-Xylene	o-Xylene
Average (ppb)	8.05	8.04	8.03	8.06	8.03	8.17
St. dev.	0.06	0.09	0.07	0.09	0.10	0.09
Rel. st. dev.	0.70	1.09	0.86	1.13	1.20	1.10

Repeatability has been evaluated on 10 sample tubes reproducibly charged with 1.2L of an 8 ppb calibration gas mixture. Relative Standard Deviation resulted lower than 1.2% for all the components.



The chromatogram shows urban air sample analysis where a 2.2 ppb Benzene concentration has been calculated.

AIR ANALYSIS

Analysis of Volatile Chlorinated Hydrocarbons in Air

Application Note AN 048

Volatile Chlorinated Hydrocarbons are known for being chemically and thermally stable compounds. Their persistance in air constitutes a health and environment hazard even in comparatively small amounts. In fact, during the past years, the Volatile Chlorinated Hydrocarbons have been identified as important risk factors for humans, causing irreversible pathologies and cancer, and for the environment, as they contribute to the formation of chlorine monoxide, one of the causes of the breaking-down of the ozone-layer.
The individual identification and quantification of pollutants permits to evaluate the influence of some air pollutant sources. Chlorinated hydrocarbons are commonly used as synthetic solvents in various industrial processes, insecticides and their presence can be detected in indoor and outdoor environments at low concentration. For this reason the use of Thermal Desorber is particularly recommanded. In the following work the Master TD Thermal Desorber is used for the analysis of volatile hydrocarbons in air showing the ENHANCED QUALITY OF THE ANALYTICAL RESULTS, UNMATCHED REPEATABILITY and accuracy with NO CARRYOVER RISK.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-048 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Volatile Chlorinated Hydrocarbons in Air.

Master DAA-048

ENHANCED QUALITY OF THE CHROMATOGRAM

The built-in and programmable Dry Step system can be used to remove humidty from the sampling tube prior the desorption, enhancing the quality of the chromatogram.

NO CARRYOVER EFFECT

The completely inert material of the entire sample flow path prevents carryover effect

UNMATCHED REPEATABILITY

The extremely precision for the electronic regulation of the gas flow rate guarantees unmatched repeatability and accuracy.

Analysis Conditions

Master GC Parameters:

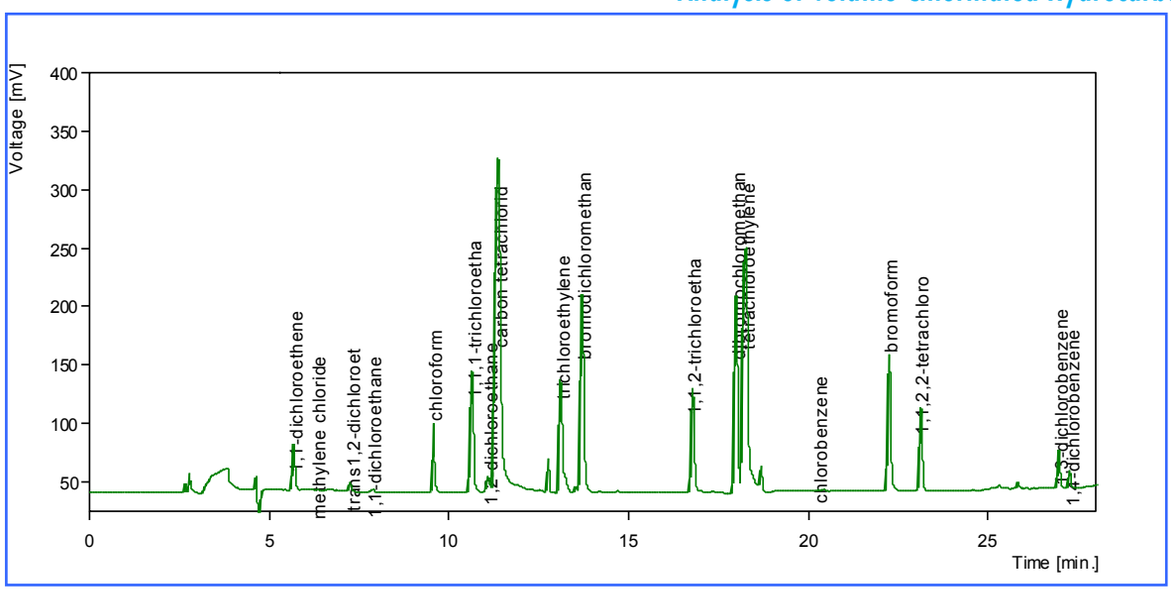
Oven	35°C (5 min), 5°C/min, 200 °C
Detector	ECD, 250 °C
Injector	SL/IN, 80 °C
Split Flow	5 mL/min
Carrier	He 1.5 mL/min
Column	DN 624 60m x 0.32 mm i.d. x 1.8 µm d_f

Master TD Parameters:

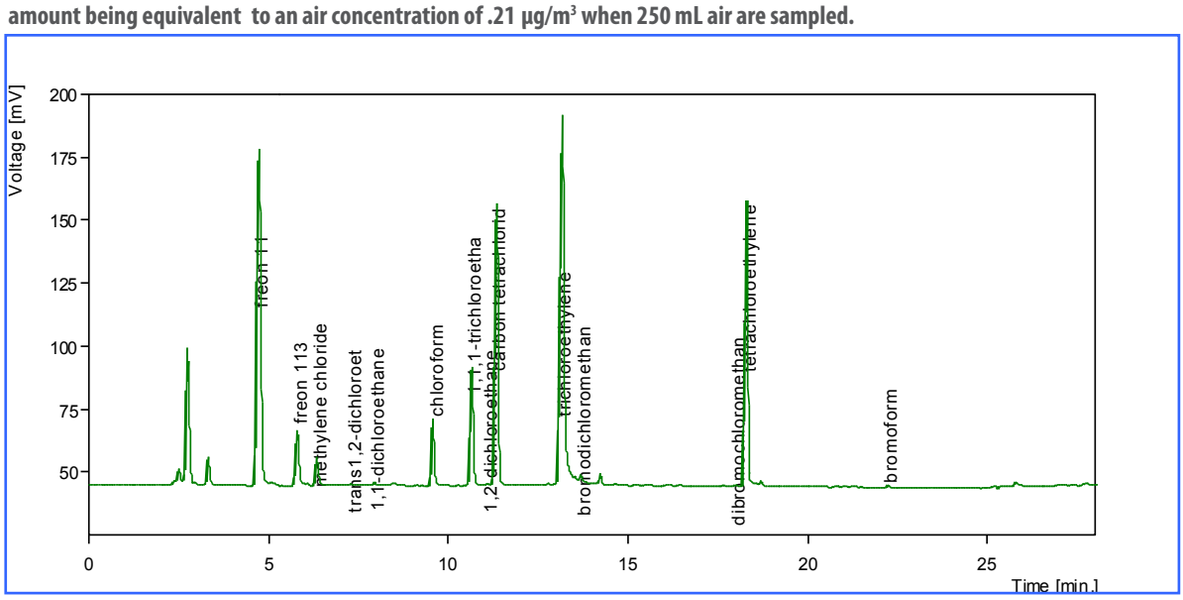
Trap	Tenax GR
Trap Temp.	adsorption 25°C, desorption 300°C for 3 min
Tube	Carbotrap B-Carbosieve S-III
Tube Desorber Temp.	300°C for 5 min

DANI
A SCENT OF FUTURE

Analysis of Volatile Chlorinated Hydrocarbons in Air



Chromatogram of a sorbent tube spiked with 0.1 µL liquid solution corresponding to 0.3 ng mass for each component, this amount being equivalent to an air concentration of .21 µg/m³ when 250 mL air are sampled.



Chromatogram of a real air sample prepared by collecting 250 mL air volume on a conditioned sample tube.

Compound	µg/m³
Methylene Chloride	24.91
trans-1,2-Dichloroethylene	0.087
1,1- Dlchloroethane	0.300
Chloroform	0.510
1,1,1-Trichloroethane	0.490
1,2-Dichloroethane	0.047
Carbon Tetrachloride	0.280
Trichloroethylene	1.840
Bromodichloromethane	0.009
Dibromochloromethane	0.0017
Tetrachloroethylene	0.350
Bromoform	0.007

Concentrations calculated for the calibrated compounds.

AIR ANALYSIS

VCM Workplace Air Monitoring by Thermal Desorption Technique

Application Note AN 124

Exposure of workers to hazardous substances must be adequately controlled. Employees are exposed to toxic substances by inhalation and thus the control requires the monitoring of airborne concentrations. The absorption of toxic organic on sorbent tube is the most widely approach used for workplace air sampling.
In the last years, a lot of international and national standards have been published based on capillary Gas Chromatography - Thermal Desorption of sorbent tubes. This technique became thus the solution of choice for occupational hygienists. In the following work the use of sorbent tube/thermal desorption gas chromatography was applied for the determination of Vinyl Chloride, a potential human carcinogen widely used in plastic industry, as refrigerant, and as an intermediate in organic sysnthesis. Occupational Safety and Health Administration (OSHA), in its method ORG 004, established that an employee exposure to Vinyl Chloride must not exceed 1 ppm 8-h time weighted average.
The aim of the analysis is to demonstrate that the Master TD is a RELIABLE and ACCURATE solution for occupational hygienists dedicated to protect workers' health.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-124 is the ready-to-go solution to attain the maximum performance in the shortest time for VCM Workplace Air Monitoring.

Master DAA-124

ACCURACY

The design of the Master TD assures the complete transfer of the analytes and their injection into the analytical column in a narrow band.

More than 95% recovery of the volatile compounds over solvent desorption.

RELIABILITY

Sample overlapping feature allows the desorption of a subsequent sample to begin while the GC analysis of the previous one is still running.

The absence of solvents and the inertness of the sample path reduces drastically the risk of carryover and of "ghost peaks"

Analysis Conditions :

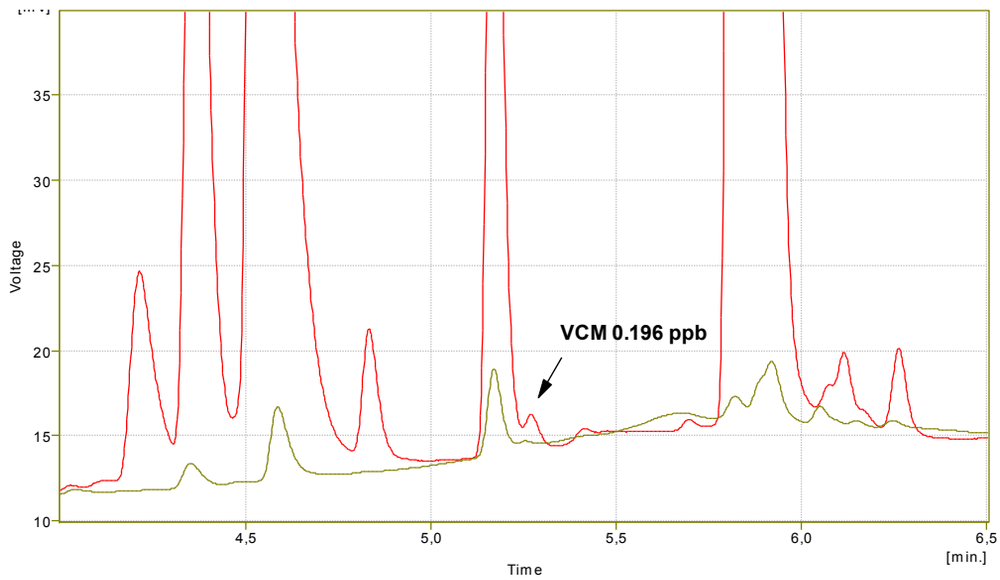
Master GC Parameters:

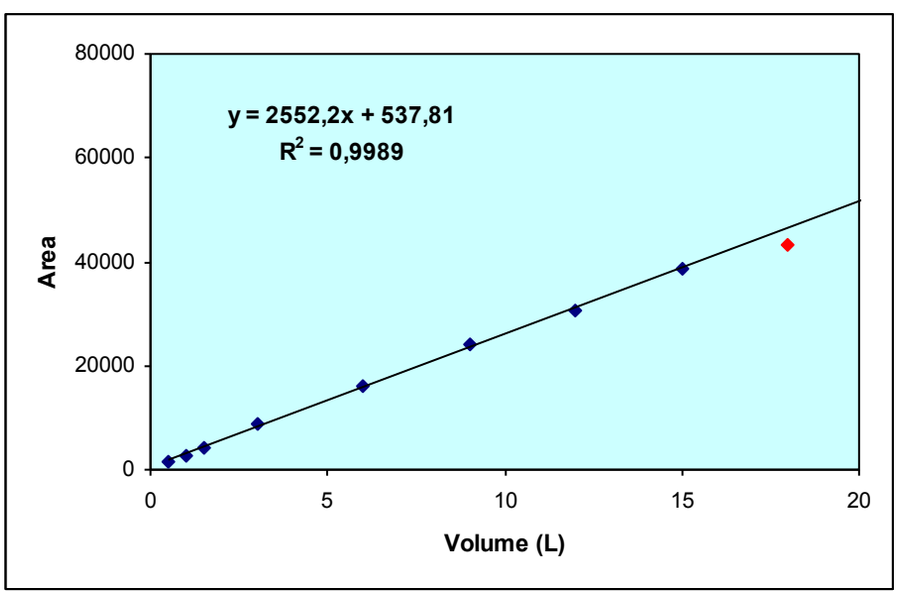
Oven	45° C (1 min.), 30°C/min., 180° C (8 min.)
Detector	250°C FID
Injector	SL/IN 250°C
Split Flow	10.5 mL/min.
Carrier	Helium 6.5 mL/min.
Column	Poraplot Q 25 m x 0.53 mm x µm df

Master TD Parameters:

Trap	Carbotrap B-Carbosieve S-III
Trap Desorption Temp.	350°
Trap Desorption Time	5 min.
Tube	Carbotrap B-Carbosieve S-III
Tube Desorbtion Temp.	350° C
Tube Desorption Time	10 min.

VCM Workplace Air Monitoring by Thermal Desorption Technique





Linearity of Vinyl Chloride response at increasing sample volumes

	0.5 L	1.0 L	1.5 L	3.0 L	6.0 L	9.0 L	12.0 L	15.0 L	18.0 L
Area	1374.84	2784.67	4378.56	8683.58	16053.10	24269.70	30568.91	38694.80	43220.90
RSD %	0.92	0.38	0.60	0.99	0.89	1.96	0.28	0.73	1.82

Areas and RSD% for Vinyl Chloride

AIR ANALYSIS

Trace Analysis of Freons
Application Note AN 125

Freons are organic compounds that, thanks to their properties, were used for a wide range of applications: as refrigerant, heat transfer medium, solvent, and in conditioning systems. As a result of the growing awareness that freons were contributing to damage in the ozone-layer, alternatives were developed, and, in some cases, the production of freons were banned.
The environmental impact caused by the use of freons has led the attention to the primary importance of an accurate quantification of these compounds, even at lowest concentration.
In the following analysis an AUTOMATED, EFFICIENT and "GREEN" method for the analysis of freons is shown.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-125 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Freons in Ambient Air.

Master DAA-125

AUTOMATED AND EFFICIENT SOLUTION

Master TD allows to run up to 50 tubes sequentially and unattended with enhanced precision and accuracy, providing increased sample throughput and decreased cost per sample. The minimal sample handling and the complete automation of all process steps ensure highly reliable and reproducible results even with unskilled operators.

GREEN TECNIQUE

Master TD sampling technique is based on the injection of gas vapors only, therefore ensuring a totally green procedure, a long analytical column life-time, and highly reliable analytical results.

Analysis Conditions :

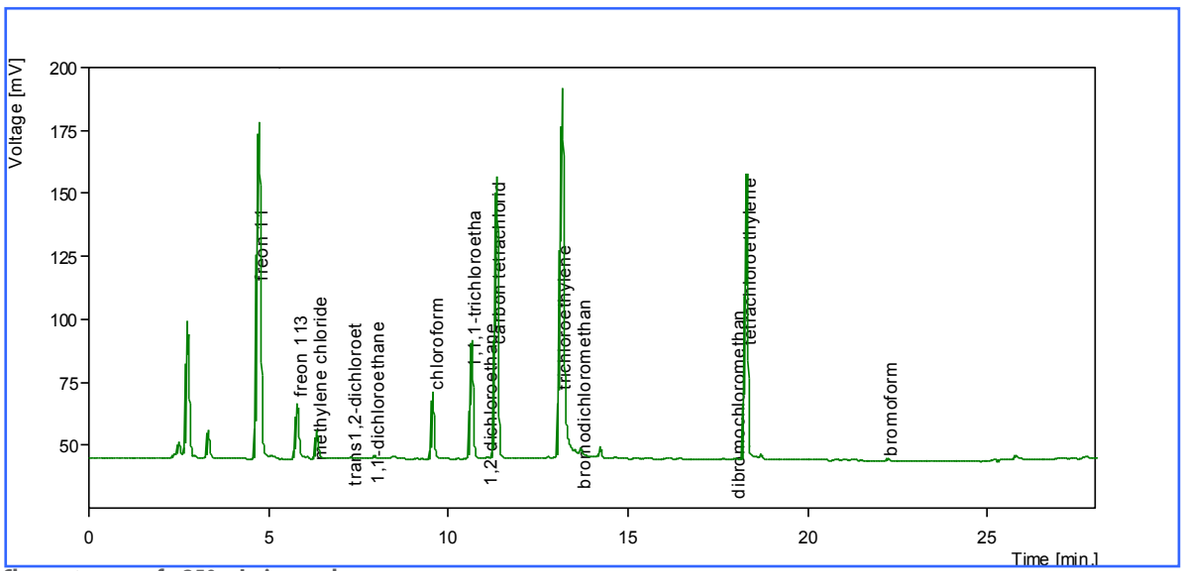
Master GC Parameters:

Oven	35°C, 5 min, 5°C/min, 200 °C
Detector	ECD, 250 °C
Injector	SL/IN 80 °C
Split Flow	5 mL/min
Carrier	He 1.5 mL/min
Column	DN 624 60m x 0.32 mm i.d. x 1.8 µm d_f

Master TD Parameters:

Trap	Carbotrap B
Trap Temp.	adsorption 25°C, desorption 300°C for 3 min
Tube Desorber Temp.	300°C for 5 min
Tube	Carbotrap B

Trace Analysis of Freons



Chromatogram of a 250 mL air sample.

Compound	µg/m³
Freon 11	1.26
Freon 113	0.52

Freons concentration for the 250 mL air sample.

	CFC11	CFC113
1	1007	382
2	1036	386
3	1013	386
4	1032	385
5	1021	386
6	1005	380
7	997	390
8	983	390
Average	1011.8	385.6
std. dev.	17.7	3.5
RSD%	1.8	0.9

Freon 11 and Freon 113 have been calibrated by sampling 100µL gas mixture in a sorbent tube thus obtaining 1.22µg/m³ and 1.66µg/m³ for Freon 11 and Freon 113 respectively. Repeatability has been evaluated on 8 identical sample tubes charged with the gas standard mixture. Relative Standard deviation resulted lower than 2.0% for both the compounds.

AIR ANALYSIS

Monitoring of Ozone Precursor in Air with On-line Sampling System

Application Note AN 030

Continuous measurement of the levels of pollutants in the air is of primary importance to protect humans and the environment from damage caused by air pollution. Data collected from CONTINUOUS MONITORING provide important information for local emission and ambient quality control as well as for studies on the effects of weather conditions especially referring to the monitoring of Ozone precursors (VOCs).
Monitoring these types of pollutants is a complex technical task. The following configuration offers an accurate, sensitive and robust solution for the measurement of Ozone precurs in ambient air. The collection of large sample volumes and the use of an enrichment step is required to reach HIGH SENSITIVITY, while a multidimensional gas chromatographic configuration is able to resolve the complexity of the analysis.
The Master Air Sampler with the Master TD Thermal Desorber permits the automated extraction of 53 VOCs. The proposed configuration features MINIMUM DETECTABLE LEVELS WELL BELOW CURRENTLY RECOMMENDED LIMITS.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-030 is the ready-to-go solution to attain the maximum performance in the shortest time for monitoring Ozone Precursors in Air with on-line sampling system.

Master DAA-030

HIGH SENSITIVITY

The electrical cooling of the sorbent trap, reaching -40°C, allows to work without cryogenic liquids to retain very volatile compounds and to avoit the risk of ice formation.

THE IDEAL SOLUTION FOR CONTINUOUS ON-LINE MONITORING

The Master Air Sampler coupled to the Master TD is the ideal solution to execute unattended field or on-line monitoring. Sample throughput can be enhanced by using the Line Selector option to process up to ten lines.

THE SYSTEM IS COMPLIANT WITH THE U.S. EPA METHODS

Analysis Conditions

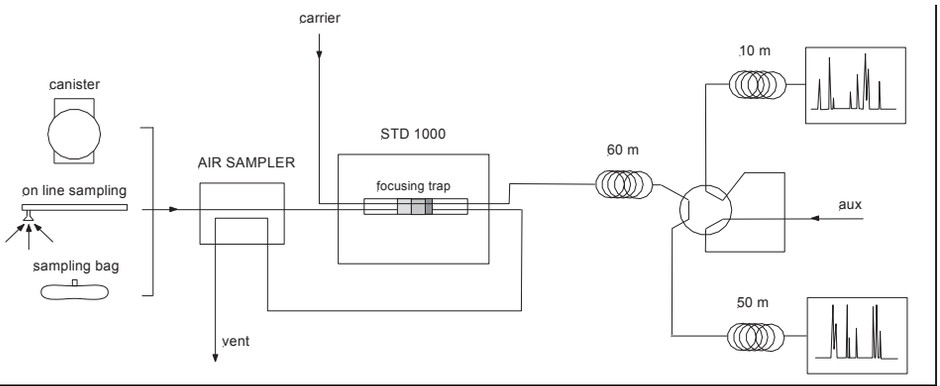
Master GC Parameters:

Oven	60°C (5min), 10°C/min, 245°C (5 min)
Detector	FID 300°C
Injector	SL/IN 300°C
Solit Flow	100ml/min.
Carrier	He 2.5ml/min.
Column	DN 1 60 m x 0.25 mm i.d. x 1 µm d_f
	Al_2O_3 / KCl 50 m x 0.25 mm i.d.
	DN-1 10 m x 0.25 mm x 1 µm d_f

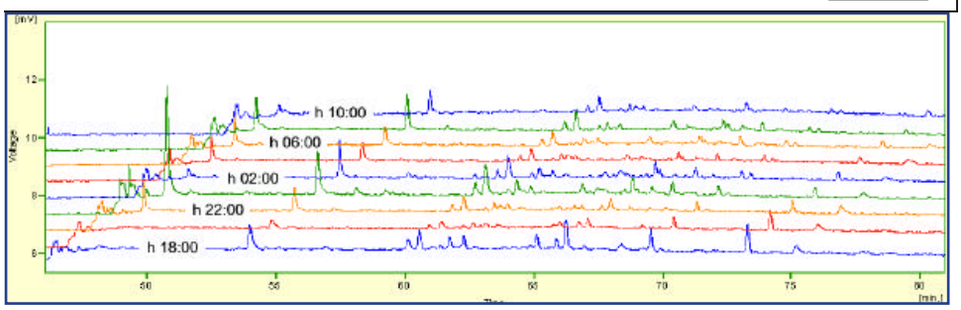
Master TD Parameters:

Trap	Tenax GR
Trap Temp.	-10/280°C
Sample Volume	450 mL

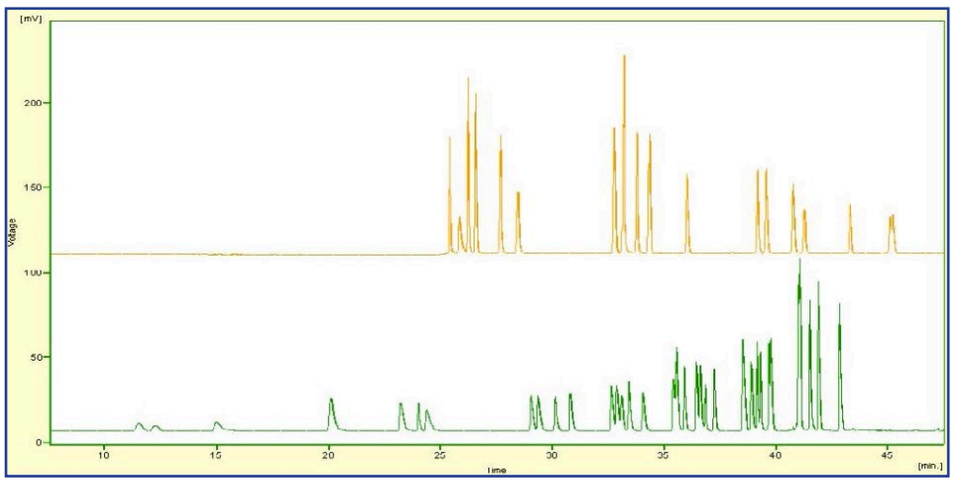
Monitoring of Ozone Precursor in Air with On-line Sampling System



System Description: A DANI Master TD equipped with the "Air Sampler" option was used to collect and enriched the air sample: the system draws a etered volume of air sample into an electrically-cooled packed trap. A multi-layer trap is used to quantitatively retain highly volatile compounds.

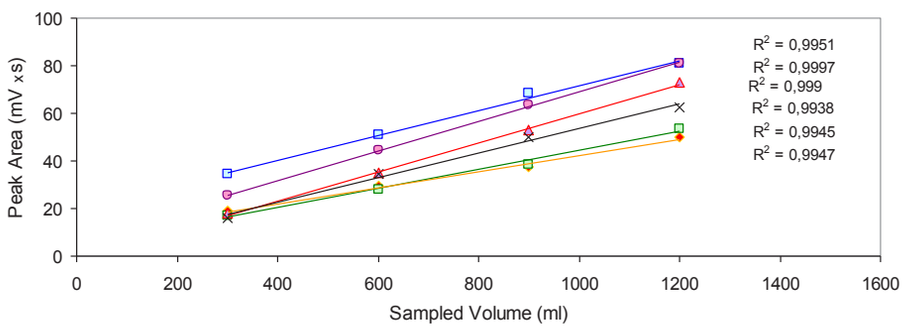


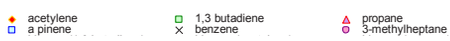
Chromatogram of a long period monitoring (12 hours) of the air surrounding the DANI building. A 1200 mL sample volume was taken at 30ml/ min flow rate.



Benzene
Cyclohexane
2,3-Dimethylpentane
2,4-Dimethylpentane
2,2,4-Trimethylpentane
Methyl-cyclopentane
2,3,4-Trimethylpentane
Toluene
2-Methylheptane
3-Methylheptane
n-Octane
Ethylbenzene
m-Xylene
o-Xylene
n-Nonane
α-Pinene
β-Pinene
1,2,4-Trimethylbenzene

Ethane
Ethene
Propane
Cyclopropane
Propylene
Isobutane
Acetylene
n-Butane
Propadiene
2,2-Dimethylbutane
trans-2-Butene
1-Butene
iso-Butylene
cis-2-Butene
Cyclopentane
Isopentane
Pentane
Propyne
1,3-Butadiene
3-Methyl-1-Butene
2-Methyl-1-Butene
2-Methyl-2-Butene
Cyclopentene
1-Pentene
trans-2-Pentene
cis-2-Pentene
2-Methylpentane
3-Methylpentane
2-Methyl-1-pentene
4-Methyl-1-pentene
cis-2-Hexene
trans-2-Hexene
Isoprene
Hexane
3-Methylhexane





Linearity calculated at four sampling volumes in the range 300-1200 mL

	acetylene	1,3 butadiene	propane	αpinene	benzene	3-methylheptane
average	33.74	62.43	35.04	66.59	68.31	116.72
SD	0.85	1.10	0.66	0.38	0.36	1.69
RSD%	2.52	1.76	1.90	0.57	0.53	1.44

Repeatability obtained with a 450 mL volume sampled at 30 mL/min for 6 significant compounds

AIR ANALYSIS

On-line Collection and Analysis of Aromatic VOCs in Air

Application Note AN 021

Continuous monitoring of Volatile Organic Compounds (VOCs) in air provides important information for emission and ambient quality control as well as for indoor and workplace studies.
Conventional techniques generally provide the concentration data as the total of organic pollutants (for example: Total Hydrocarbons or Nonimethane Hydrocarbons). However, the determination of single VOC concentration allows an accurate identification of pollution sources and their influence on the quality of the environment.
Coupling an on-line collection of high sample volume to high-resolution gaschromatography is certainly the most suitable and sensitive approach to perform accurate and reliable identification and quantitation of VOCs. The following analysis was conducted to demonstrate the OUTSTANDING PERFORMANCE of the COMPLETELY AUTOMATED PROCESS of the Master TD Thermal Desorber applied to VOC pollutants in air.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-021 is the ready-to-go solution to attain the maximum performance in the shortest time for on-line collection and analysis of Aromatic VOCs in Air.

Master DAA-021

COMPLETELY AUTOMATED PROCESS

Automatic sampling (up to 10 lines) through Master Air Sample
Complete automation of all process steps

OUTSTANDING PERFORMANCE

Highly precise, accurate, and reproducible sample collection

Analysis Conditions :

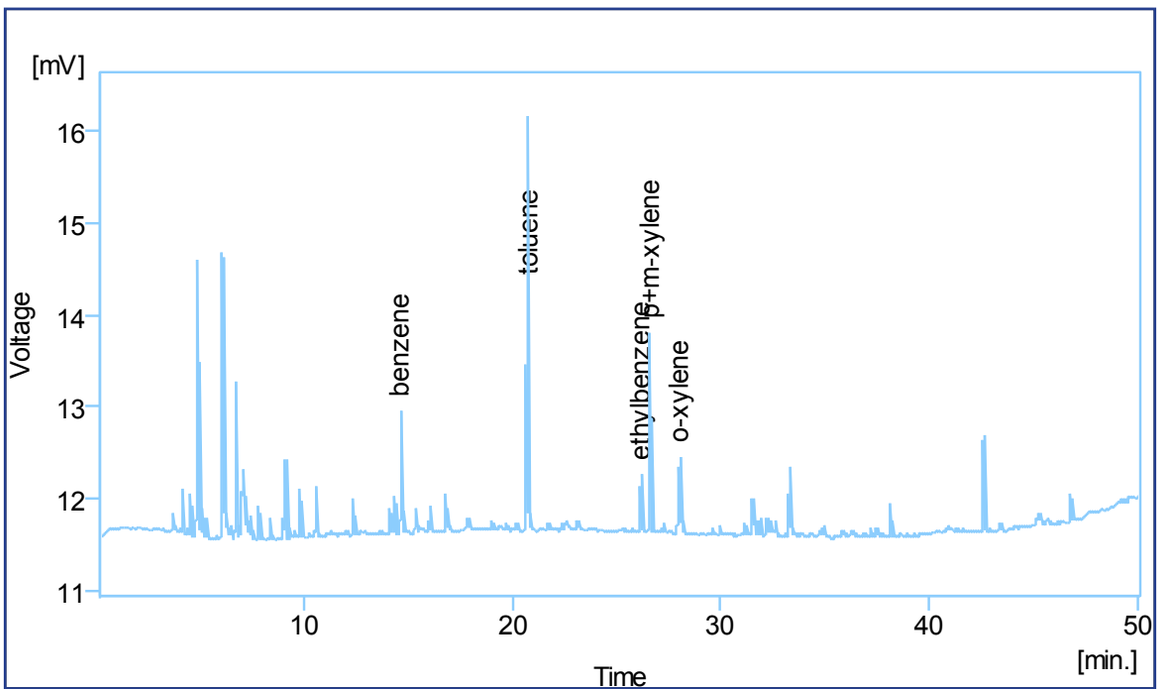
Master GC Parameters:

Oven	40°C (6 min.), 4°C/min. to 200°C
Detector	FID 350°C
Injector	SL/IN 200°C
Split Flow	12.5 mL/min.
Carrier	Helium 1.5 mL/min.
Column	Carbowax, 30 m x 0.25 mm i.d. x 0.25 µm d_f

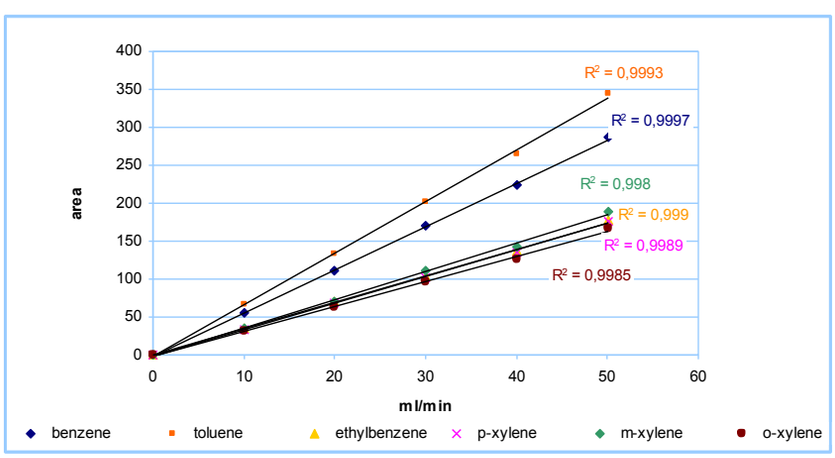
Master TD Parameters:

Trap	TENAX GR
Trap Temp	-10°C/280°C
Sample Volume	1200 mL

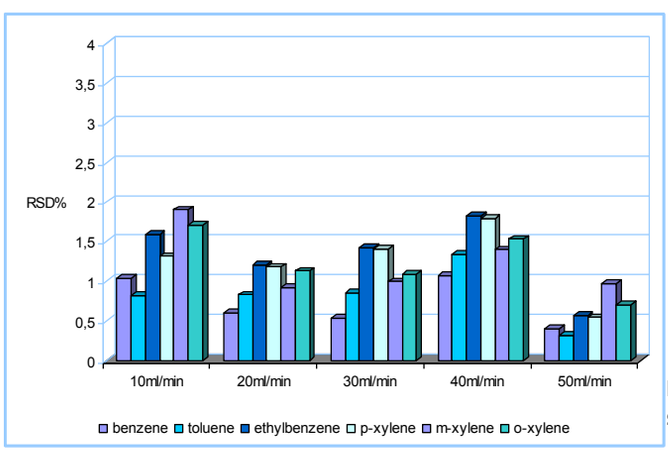
On-line Collection and Analysis of Aromatic VOCs in Air



Chromatogram obtained from the air analysis on a rush hour. Benzene concentration was 17.63 µg/m³ (5.3 ppb)



Linearity results obtained at different volume in the range 300-1500 mL



Repeatability results: 10 repetitions for each sampling rate, 30 minutes sampling time.

AIR ANALYSIS

Determination of Glycol Ethers in Air

Application Note AN 126

Glycol ethers are a group of compounds used as solvents having a high boiling point. Most glycol ether compounds are clear, colourless and liquid. They are used mainly for resins, paints, papers, cosmetics and pharmaceutical products.
Recent studies have suggested that overexposure to glycol ethers can be dangerous for human health. As some members of this family of compounds evaporate quickly and can easily reach hazardous level in air, it is very important to quantify their concentration not only in raw materials, but also in both indoor and outdoor environment. Besides, according to regulatory methods, in order to obtain improved analytical collection and recovery results, it is important to REDUCE THE DEGRADATION, DECOMPOSITION AND THE HYDROLYSIS OF ANALYTES.
The following analysis shows how to achieve these goals through the use of Master TD Thermal Desorber.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Air Analyzer DAA-126 is the ready-to-go solution to attain the maximum performance in the shortest time for the determination of Glycol Ethers in Air.

Master DAA-126

HIGH EFFICIENCY OF ANALYTE TRANSFER

Instantaneous heating of the trap through an exclusive built-in device and backflush desorption of the trap assure the transfer of analytes as a narrow band into the GC column.

NO NEED OF CRYOGENIC LIQUIDS

The electrical cooling of the sorbent trap, reaching -40°C, allows to work without cryogenic liquids to retain very volatile compounds and to avoit the risk of ice formation.

PREVENTION FROM CONTAMINATION, DEGRADATION AND SAMPLE LOSS

Each desorption process is preceded by an automated and effective tube leak test. In addition, tubes are sealed with septa and caps that are not removed.

Analysis Conditions :

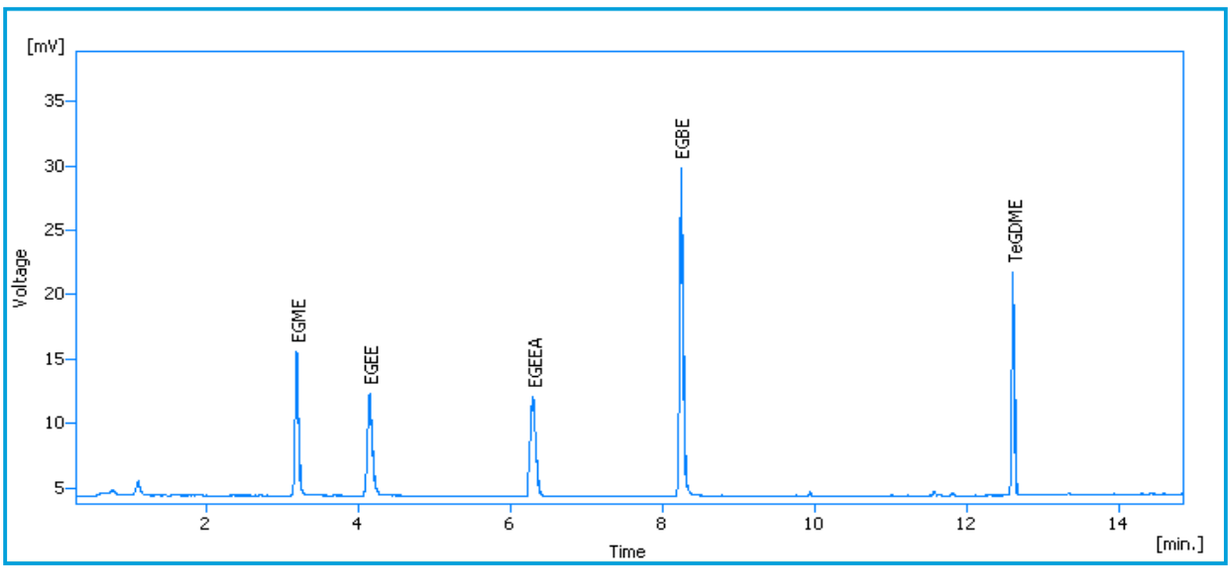
Master GC Parameters:

Oven	60°C (5min.), 10°C/min., 245°C (5 min.)
Injector	SL/IN 300°C
Detector	FID 300°C
Carrier	He 2.5ml/min.
Split Flow	100ml/min.
Column	DN WAX 15m x 0,32mm i.d. x 0,5µm d_f

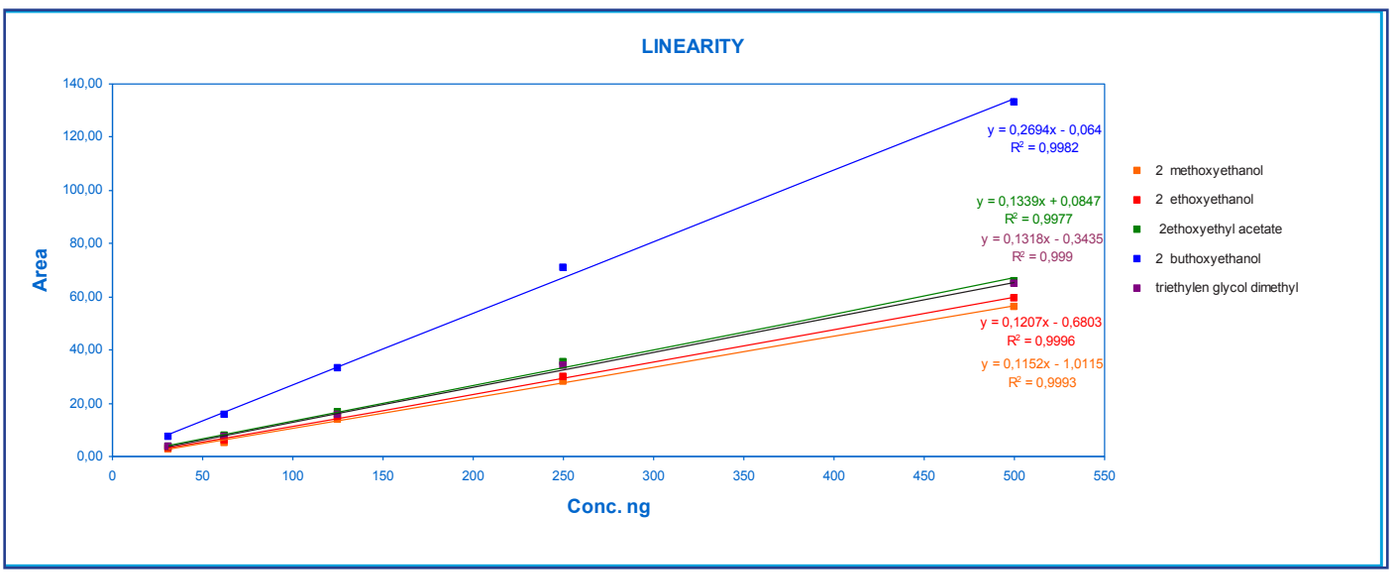
Master TD Parameters:

Trap	Tenax GR
Trap Temp	-10/280°C
Tube	Tenax GR
Tube Desorber Temp	250°C

Determination of Glycol Ethers in Air



Liquid Standard Mixture containing equal weights of each component (250ng).



The standard tubes were prepared by injecting aliquots of liquid standard onto a conditioned Tenax GR sorbent tube. The tube, connected to the gas chromatographic injector, was purged with an inert gas for 10 minutes at 60 mL/min.

AIR ANALYSIS

Sampling and Determination of Phenols by Thermal Desorption Technique

Application Note AN 017

Phenols are both naturally occurring and manufactured chemical substances. This type of compounds are found in a number of consumer products such as medicines and personal care products and in some food. In the environment phenols may be transportated by air and water or contaminated products. Among the possible toxic effects of these pollutants in the environment are shortened lifespan, reproductive problems, even death of animals and plants can be included.
Over-exposure to phenols may affect also human health. The Occupational Safety and Environmental Administration set a limit of 5 ppm of phenols in workroom air to protect workers. Such low concentrations require the use of a HIGHLY SENSITIVE TECHNIQUE.
Thermal desorption / gas chromatography is the preferred and MOST CONVENIENT technique for separation and simultaneous determination of phenols.
The following work has been carried out using thermal desorption tubes and subsequent gas chromatographic analysis.

HIGH SENSITIVITY

The two-stage thermal desorption thermal desorption process of the Master TD permits that the sampling tube is heated and the volatile and semi-volatile compounds are enriched on the sorbent trap.

CONVENIENT

Time-saving system
No use of solvents required
Re-utilization of the sampling tubes

Analysis Conditions :

Master GC Parameters:

Oven	40°C (15min.), 7.5°C/min., 320°Cv
Detector	FID 350°C
Injector	SL/IN 350°C
Split Flow	75 ml/min.
Carrier	He 7.5ml/min.
Column	DN-5 30m, 0.32mm, 0.5µm

Master TD Parameters:

Trap	Glass Wool/Tenax GR
Trap Temp.	-10/450°C
Tube	400°C
Tube Desorber Temp.	400°C
Sample Volume	3 µl, 100 ppm

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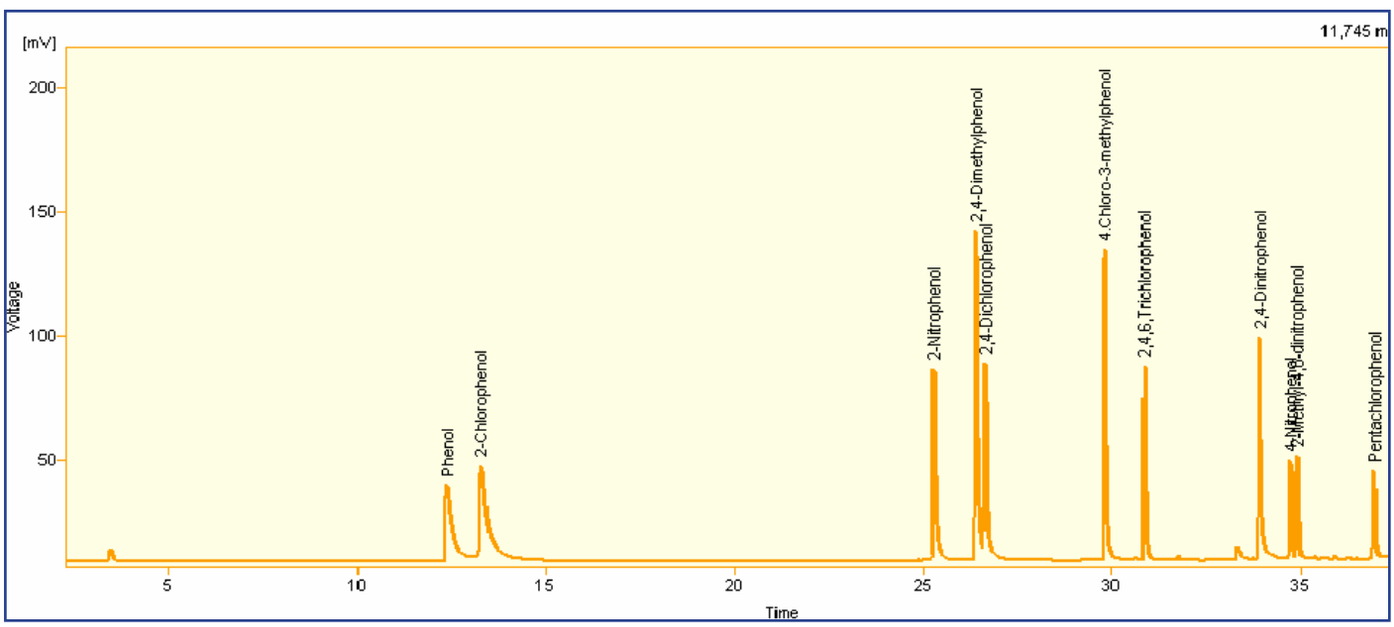
Sampling and Determination of Phenols by Thermal Desorption Technique



Compounds	
1) ohenol	6) 2,4,6,trichlorophenol
2) 2-chlorophenol	7) 2,4-dinitrophenol
3) 2-nitrophenol	8) 4-nitrophenol
4) 2,4-dichlorophenol	9) 2-methyl-4,6-dinitrophenol
5) 4-chloro-3-methylphenol	10) pentaclorophenol

“When soil and groundwater are contaminated, crops, livestock and drinking water may become affected and, when they are consumed by human beings, health risks may occur.

Source: Assessing Soil Contamination - FAO”

SOIL ANALYSIS

Chemical analysis allows quantification of important hazardous such as pollutants which are very often present on a contaminated sites. Contaminated site refers to land adulterated by substances that may pose a risk to human health or the environment. Contamination can occur as a result of poor environment management in industrial, commercial, and other human activities.
In the following pages a full range of solutions that allow to achieve accurate, precise, and reliable results in a short period of analysis time are presented.
DANI Instruments has continued to implement innovative techniques by introducing in the market very reliable, extremely versatile and easy to use instruments that meet soil monitoring real requirements.

Decades of experience in developing applications for the Environmental industry are the basis of the Master DSA DANI Soil Analyzers.

SOIL ANALYSIS

“Time is Money.”

Benjamin Franklin

Time is always a key factor in today’s laboratories productivity.

Master your Time with the Master DANI Soil Analyzers.

The ability to provide the proper configuration to meet the most challenging analytical demands comes from a long and proven experience and a deep industry knowledge. As requirements are constantly changing, even a highly reliable instrumentation could not be enough to succeed in getting trustworthy results: complete and guaranteed solutions are essential to comply with the latest industry standards and specifications.
After a long relationship with its customers to know and to best match their real needs, DANI Instruments has developed key analytical solutions that cover a broad array of applications, requirements and protocols in the environmental industry.
Master DANI Soil Analyzers are PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS specifically designed for specific analyses. The analyzers include the HARDWARE, the SOFTWARE, COLUMNS AND CONSUMABLES, the OPTIMIZED ANALYSIS METHOD, the ANALYTICAL CONDITIONS, and the DOCUMENTATION to run up your analysis from day one.

PRE-CONFIGURED, PRE-ASSEMBLED AND FACTORY-TESTED SYSTEMS

The installation process is faster than ever before and all the startup procedure is oversimplified ensuring immediate analytical performance and results.

HARDWARE AND SOFTWARE

DSA Analyzers are pre-engineered systems based on the versatility, flexibility and robustness of the proven Master GC hardware. All the Master GC parameters are set prior the shipment.

COLUMNS AND CONSUMABLES

No more doubts about the proper column, parts and supplies. DSA Analyzers are delivered with all you may need for your analysis.*

OPTIMIZED ANALYSIS METHOD

Analytical methods are pre-loaded to be immediately used for the determination of pollutants in soil.
Whenever possible, reduction of analysis time and amounts of toxic solvents are considered. Method development time and costs are thus dramatically reduced.

ANALYTICAL CONDITIONS

DSA Analyzers are designed to perfectly accomplish the analytical conditions of interest.

DOCUMENTATION

A getting started manual, calibration and method files, and all the information for a quick startup are included .

View your Analyzer:

Master DSA-121
Fast PCBs Determination in Soil Analyzer

* Chemicals are not supplied

DANI

A Scent Of Future

Master GC
Fast Gas Chromatograph

High Productivity
Accuracy and Precision
Flexibility and Upgradeability
User Friendly Interface

The versatile and flexible Master GC delivers unsurpassed analytical capabilities meeting today's laboratories productivity requirements. The GC was uniquely designed to perform conventional and fast gas chromatographic analyses.
The primary goal of Fast GC is to maintain proper resolving power in shorter analysis run times by using adequate instrumentation and analytical columns in combination with optimized method parameters. The Master GC features a maximum heating rate up to 140° C/min and a typical cooling time of 4 min. In addition, DANI offers a variety of detectors engineered with fast electronics to handle sharp peaks; data acquisition rates of up to 300 Hz are performed.

Master TOF
Time of Flight GC/MS

Extremely Compact Design
High Productivity
Powerful Software Solution
Walkaway Automation

The Master TOF-MS detector performs the fastest acquisition rates (1000 spectra/s) and the widest linear dynamic range (10^5) available in the market. These capabilities are offered in an extremely compact bench-top instrument. In combination with the Master GC, the system is the ideal solution for Fast GC and GCxGC laboratories.
The Master LAB Software offers the proper tool for the reliable control of the system, from autotuning procedures to GC and sample sequence management. An original deconvolution algorithm capable to handle a large amount of information in a smart and effective way provides trustworthy identification of trace compounds even in complex matrices.

Master SHS
Static Headspace Sampler

A Robust and Flexible System to Meet Complex and Versatile Needs

The Master SHS delivers the highest performances to overcome daily new challenges and supplies trustworthy and enhanced results. The highest sample capacity and the unlimited priority sample position provide straightforward results for virtually any analytical need in real time. The Valve&Loop Technique, the known and fixed volume of the sample, the accurate temperature control and the entirely chemically inert sample flow path guarantee outstanding repeatability and avoid the risk of false results, sample loss or recondensation.

Master DHS/P&T
Dynamic Headspace and Purge&Trap Sampler

A Dynamic Approach to High Sensitivity Headspace Analysis

The Master DHS/P&T provides the most versatile, state-of-the-art system for headspace analysis featuring the capabilities of a Purge&Trap system. It combines the high sensitivity of the Dynamic Headspace technique with the productivity, ease of use, and flexibility of a completely automated solution.
The Master DHS/P&T offers up to a 100-fold increase in sensitivity over conventional headspace techniques and assures detection limits beyond capability of SPME.

Master TD
Thermal Desorber

The Ultimate Solution for High Sensitivity Detection of Volatiles

The Master TD offers superior sensitivity, versatility, and productivity for the extraction of volatile and semi-volatile compounds from air and solid matrices. The excellent analytical performances of the system is guaranteed by the two-stage thermal desorption process and supported by the patented "Instant Desorption" of the trap. This design assures the complete transfer of the analytes and their injection into the analytical column in a narrow band to preserve chromatographic resolution and accuracy. The fully automated control of the system provides high sample capacity and optimal sampling tube processing for maximum system productivity.

SOIL ANALYSIS

TABLE OF CONTENTS

Organochlorinated Pesticides

α - BHC
β - BHC
γ - BHC
δ - BHC
heptachlor
aldrin
heptachlor epoxide
endosulfan I
4,4' DDE
dieldrin
endrin
4.4' DDD
endosulfan II
endrin aldehyde
4,4' DDT
endosulfan sulfate

EPA Method 8081

Application Note AN 063
Determination of Organochlorinated Pesticides

Organophosphorus Pesticides

trichlorfon
tionazine
phorate
diazinone
CH3-parathion
chlorpyriphos
parathion
quinalphos
metidathion
yrithion
C2H5-azinphos
phosdrin
ethoprophos
phonophos
CH3-chlorpyriphos
CH3-pirimiphos
malathion
pirimiphos
C2H5-bromophos
ethion
CH3-azinphos

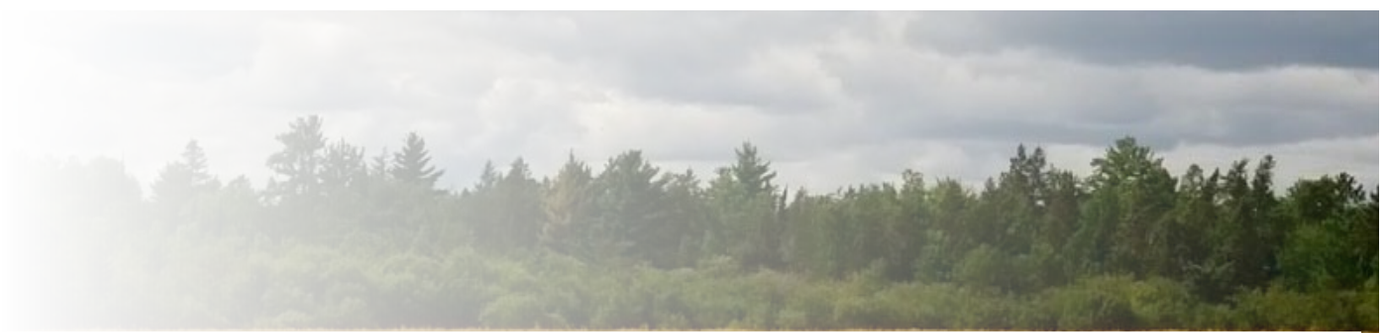
Application Note AN 095
Determination of Organophosphorus Pesticides

SOIL ANALYSIS

Phenols: FAST GC ANALYSIS

Application Note AN 007

Phenols are a class of very common chemical compounds. They can be found in soils underlying chemical storage depots, gas plants, soils that receive continuous wastes and decomposition of organic waste, and as a result of the combustion of wood. The environmental pollution of soil by phenols is a major environmental concern. They represent a danger to the environment and to human health. In fact, phenols are hematotoxic and hepatotoxic, provoke mutagenesis and carcinogenesis towards humans and other living organisms.
For this reason U.S. EPA takes into account the analysis of phenols in a variety of methods including EPA Method 8041.
The following analysis demonstrates a **Fast GC Analysis** for eleven target compounds in less than five minutes showing a method with **High Data Accuracy** maintaining the **Integrity of the Sample**.



METHOD FOR THE FAST DETERMINATION OF PHENOLS IN SOIL

Conventional GC average analysis time: 30 minutes.
DANI Master GC analysis time : less than 5 minutes.

HIGH RESOLUTION POWER AND EXCELLENT ACCURACY

The Fast Dedicated Column with narrower internal diameter and thinner stationary phase films features faster analysis time while maintaining proper resolving power.

SAMPLE INTEGRITY PRESERVATION

The versatile DANI PTV injector is particulary suggested for this type of analysis.

Analysis Conditions

Master GC Parameters:

Oven	80°C (1min), 40°C/min., 220°C (0.5min)
Detector	FID 400°C
Injector	PTV 80°C, 999°C/min, 400°C
Split Flow	25mL/min, split ratio 1:50
Carrier	H_2 0.5mL/min
Column	DN 5 FAST 15m x 0.10mm i.d. x 0.10 µm d_f
Volume Injected	0.5 µL

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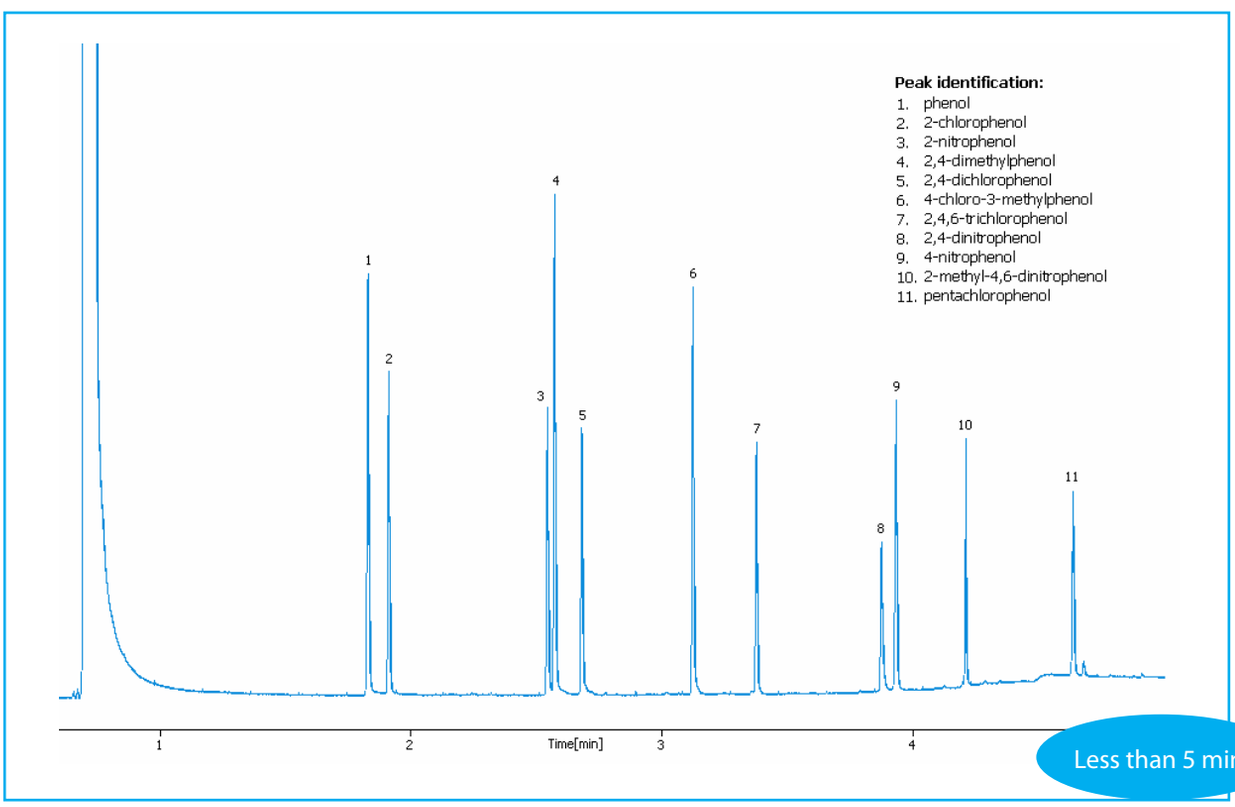
Phenols: FAST GC ANALYSIS



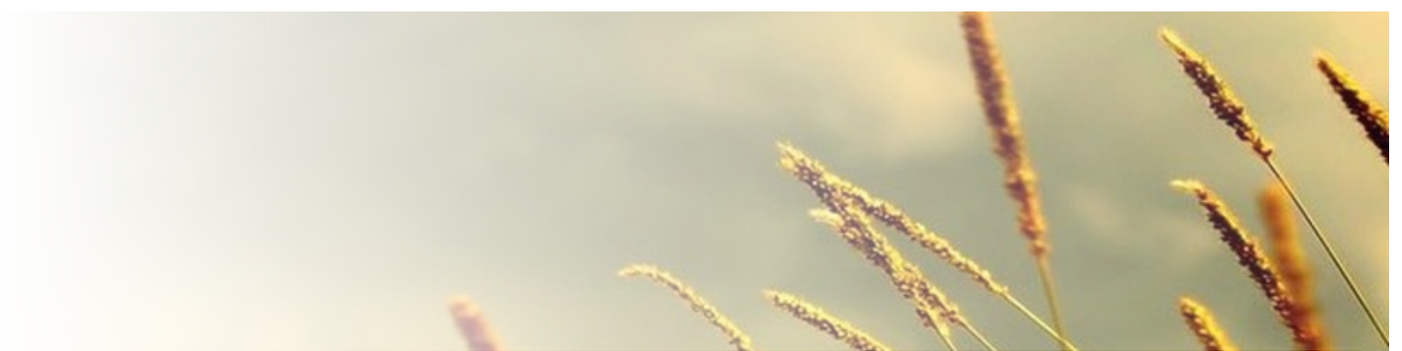
Compounds	Retention Time Std dev. (min)	Compounds	Retention Time Std dev. (min)
phenol	0,0013 i	2,4,6-trichlorophenol	0,0012
2-chlorophenol	0,0013	2,4-dinitrophenol	0,0016
2-nitrophenol	0,0016	4-nitrophenol	0,0010
2,4-dimethylphenol	0,0015	2-methyl-4-dinitrophenol	0,0013
2,4-dichlorophenol	0,0013	pentachlorophenol	0,0015
4-chloro-3-methylphenol	0,0012		

SOIL ANALYSIS

Poly Aromatic Hydrocarbons (PAHs) - Fast GC Application

Application Note AN 003

PAHs are organic compounds that can be found in air, water, soil, and food. They are among the most studied pollutants as they have shown to be carcinogenic and mutagenic to animals and humans.
Soil contamination can be caused by industrial areas emissions, contaminated water and applications of sludge and sediments on agricultural soils. Because of their inner characteristics (very low water solubility and difficult biodegradation) PAHs are subjected to the aging phenomenon, dramatically increasing the compound presence in the soil.
U.S. EPA 8100 method provides gas chromatographic conditions for the detection of ppb levels of certain polynuclear aromatic hydrocarbons.
The aim of the following application is to present the **FAST ANALYSIS** of 18 representatives of the PAHs class of compounds at concentrations that **MEET THE EPA METHOD REQUIREMENTS** in less than 10 minutes. The results show **OUTSTANDING RESOLUTION POWER.**



EXCELLENT PEAK RESOLUTION

Fast Dedicated Column (DN-PAH-FAST)
Fast Acquisition Rate of the Detector (300 Hz)

PAHs FASTEST ANALYSIS

Less than 10 minutes analysis time

OUTSTANDING RESOLUTION POWER

The system , along with the optimal control of the oven temperature and the fast detector, assures an outstanding resolution power, unprecedent for all chromatographic measurements.

REGULATORY COMPLIANT RESULTS

Analysis Conditions

Master GC Parameters:

Oven	140°C (0.5min), 30°C/min, 220°C, 15°C/min, 300°
Detector	FID 400°
Injector	PTV 80°C, 600°C/min, 400°C
Split Flow	50 mL/min., split ratio 1:100
Carrier	H_2 0.5mL/min
Column	DN PAH FAST 15m x 0.10mm i.d. x 0.10 µm d_f
Sample Volume	0.5 µL

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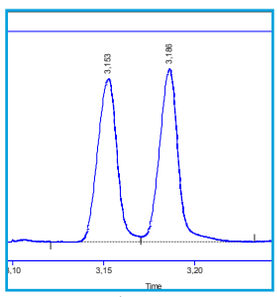
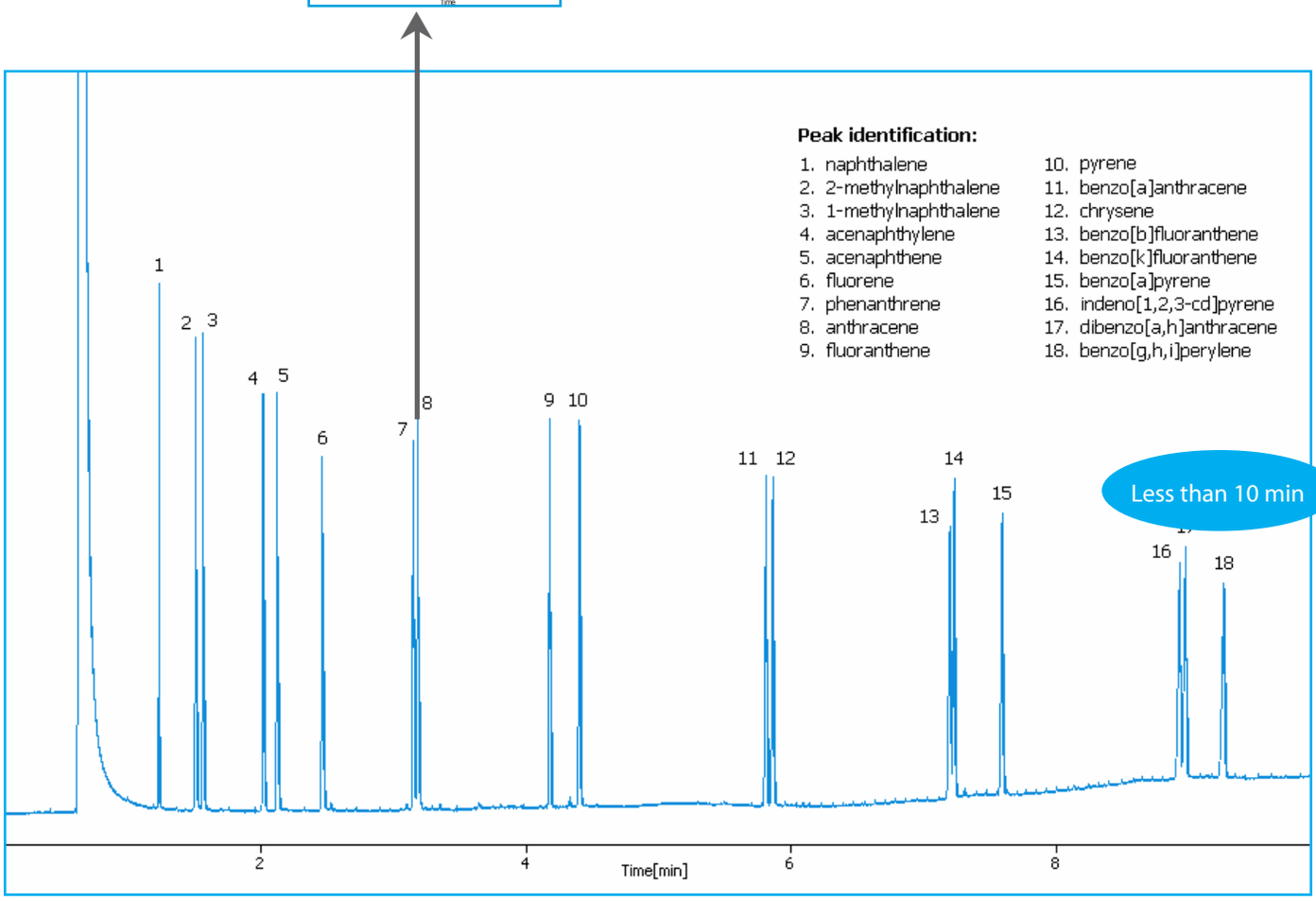
Polyaromatic Hydrocarbons (PAHs) - Fast GC Application



phenanthrene and anthracene resolution value : 1.35



SOIL ANALYSIS

Fast GC approach for PCBs Determination

Application Note AN 121

Polychlorinated biphenyls are a class of organic compounds known for their high level of toxicity and classified as persistent organic pollutants. Thanks to their useful characteristics such as non-flammability, heat resistance, insulation and chemical stability, in the past they were extensively used as coolants and dielectric fluids, stabilizing additives in PVC and plastic products, reactive flame retardants, sealants, paints, etc.
The toxicity associated to PCBs was recognized and known very soon, since before their first commercial production in 1970s. Nevertheless, PCB production was banned by the United States Congress in only in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.
The EPA METHOD 8082 is used to determine the concentration of PCBs in extracts from solid and aqueous matrices. The analytical protocol is based on conventional gas chromatography coupled to electron capture detection technique. This method generally requires 20-30 minutes for the chromatographic separation of these compounds. Fast gas chromatography, typically involving 100 µm i.d. and 10 m columns, represents a powerful alternative to conventional GC, allowing to achieve equivalent RESOLUTION IN SIGNIFICANTLY SHORTER ANALYSIS TIME.
In this work, fast GC is applied to the analysis of PCBs. The technology is implemented on DANI Master GC, which operates with short narrow bore columns and fast ECD to guarantee high resolution and sensitivity. The data obtained confirm the suitability of the technique for the routine analysis of this kind of compounds.

Do you wish to streamline the process, boost your productivity and save time and hassles?

DANI Soil Analyzer DSA-121 is the ready-to-go solution to attain the maximum performance in the shortest time for your analysis of Halogenated Hydrocarbons in Soil.

Master DSA-121

SIGNIFICANT REDUCTION OF THE ANALYSIS TIME WITHOUT LOSS OF RESOLUTION

High acquisition rate up to 300 Hz
High separation power of the column

FAST AND CONVENTIONAL ANALYSIS IN A UNIQUE SYSTEM

Extreme Flexibility of the DANI Master GC

ACHIEVEMENT OF THE LIMITS SET BY THE EPA METHOD

EPA Method 8082 mandates quantitation limits down to 0,17 ng/L

	Conventional GC	Fast GC	
Column	DN 5 - 30m x 0.25 x 0.25µm d_f	DN 5 - 10m x 0.1mm x 0.2µm d_f	DN 5 - 5m x 0.1mm x 0.2µm d_f
PTV Injector	50°C, 600°C/min, 320°C (2min)	50°C, 600°C/min, 320°C (2min)	50°C, 600°C/min, 320°C (2min)
Oven	120°C, 10°C/min, 300°C (4min)	120°C, 25°C/min, 200°C, 20°C/min, 300°C/min (2 min)	120°C, 25°C/min, 200°C, 20°C/min, 300°C/min (2 min)
Carrier Gas (Helium) Flow Rate	1mL/min	0.5 mL/min	0.5 mL/min
Split Ratio	1:10	1:50	1:50
ECD Detector	320°C	320°C	320°C
Digital Aquisition Rate	25 Hz	300 Hz	300 Hz
Injection Volume	1µL	0.5 µL	0.5 µL

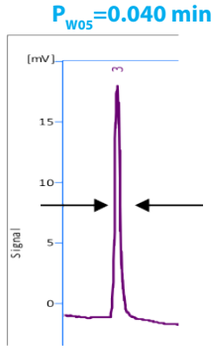
Fast GC approach for PCBs Determination

Compound	Repeatability (min)		Water Sample Limit ng/L	
	RT (SD)	Area (RSD)	LOD	LOQ
1) 2,4,5,6-tetrachloro-*m*-xylene (S.S)	0.001	1.011	1.784	5.825
2) 2,3-dichlrobiphenyl	0.001	0.819	101.010	336.700
3) 2,2′,5′-trichlorobiphenyl	0.000	1.021	186.916	623.053
4) 2,4′,5-trichlorobiphenyl	0.002	1.267	150.376	501.253
5) 2,2′,5,5′-tetrachlorobiphenyl	0.001	1.667	119.760	399.202
6) 2,2′,3,5′-tetrachlorobiphenyl	0.001	1.584	81.301	271.003
7) 2,3′,4,4′-tetrachlorobiphenyl	0.002	1.101	70.671	235.571
8) 2,2′,4,5,5′-pentachlorobiphenyl	0.001	1.757	70.671	135.571
9) 2,2′,3,4,5′-pentachlorobiphenyl	0.002	1.319	45.147	150.489
10) 2,3,3′,4′,6-pentachlorobiphenyl	0.002	0.942	43.478	144.928
11) 2,2′,3,5,5′,6-hexachlorobiphenyl	0.002	1.509	33.898	112.994
12) 2,2′,4,4′,5,5′-hexachlorobiphenyl	0.002	1.770	26.316	87.719
13) 2,2′,3,4,5,5′-hexachlorobiphenyl	0.001	1.572	19.627	65.424
14) 2,2′,3,4,4′,5′-hexachlorobiphenyl	0.001	1.274	30.441	101.471
15) 2,2′,3,4′,5,5′,6-heptachlorobiphenyl	0.002	1.725	18.570	61.900
16) 2,2′,3,4,4′,5′,6-heptachlorobiphenyl	0.002	0.917	16.906	56.354
17) 2,2′,3,4,4′,5,5′-heptachlorobiphenyl	0.002	0.950	16.300	54.333
18) 2,2′,3,3′,4,4′,5-heptachlorobiphenyl	0.001	1.385	16.750	55.835
19) 2,2′,3,3′,4,4′,5,5′,6-nonachlorobiphenyl	0.002	1.132	16.681	55.602
20) decachlorobiphenyl (I.S.)	0.002	1.364	1.299	4.331

Repeatability, LOD and LOQ calculated for each target compound were obtained with the 10 m column (comparable results were achieved with the 5 m column)

CONVENTIONAL GC
30 m x 0.25 mm column
acq. rate 25 Hz

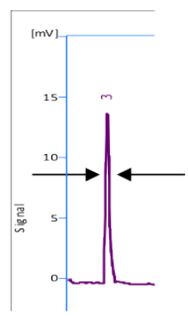
P_{W05}=0.040 min



S/N=161.128

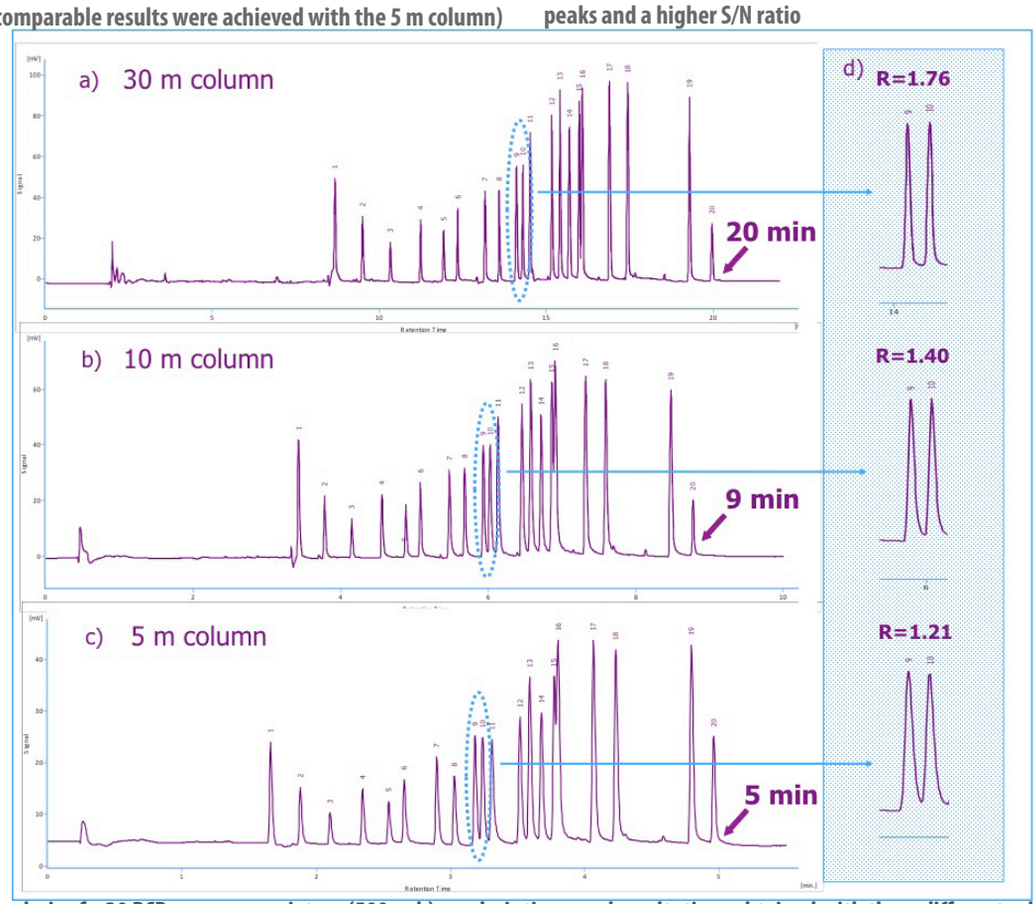
FAST GC
10 m x 0.1 mm column
acq. rate 100 Hz

P_{W05}=0.023 min



S/N=480.275

Peak width and S/N comparison : Fast GC provides narrower peaks peaks and a higher S/N ratio



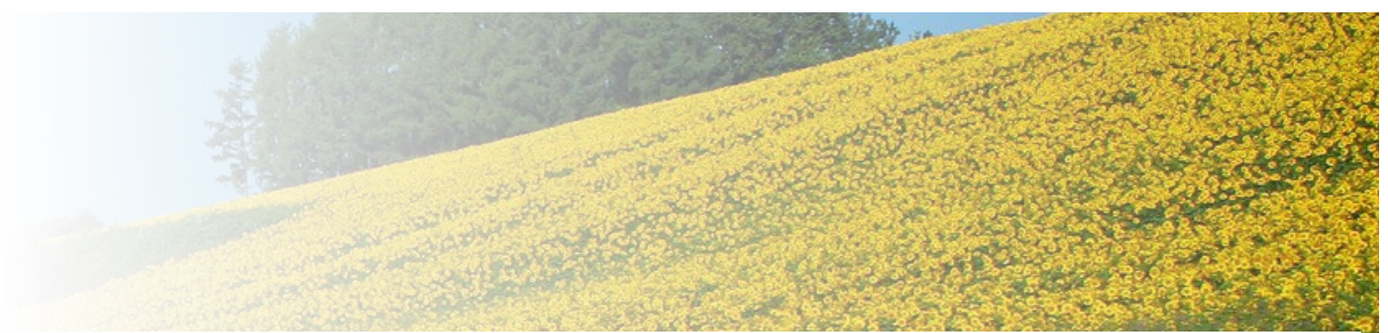
Analysis of a 20 PCB congeners mixture (500 ppb): analysis times and resoltutions obtained with three different columns

SOIL ANALYSIS

Determination of Phtalates

Application Note AN 052

Phtalate esters are contaminants mainly used in a large variety of products such as children toys, entering coatings of pharmaceutical pills, cosmetics, detergents, film formers and, more generally, plastic products. Recent studies link phtalates to different human deseases, from disruption for the endocrine system to cancer.
Phtalates can be found at measurable concentrations almost everywhere for their high production volumes and almost continuous release in the environment.
It is therefore of primary importance to have an EXTREME PRECISE METHOD of analysis able to answer to REAL ANALYTICAL NEEDS.



ESTREME PRECISION

The patented Digital Flow Control (DFC) assures unprecedent retention time repeatability.

THE ANSWER TO REAL ANALYTICAL NEEDS

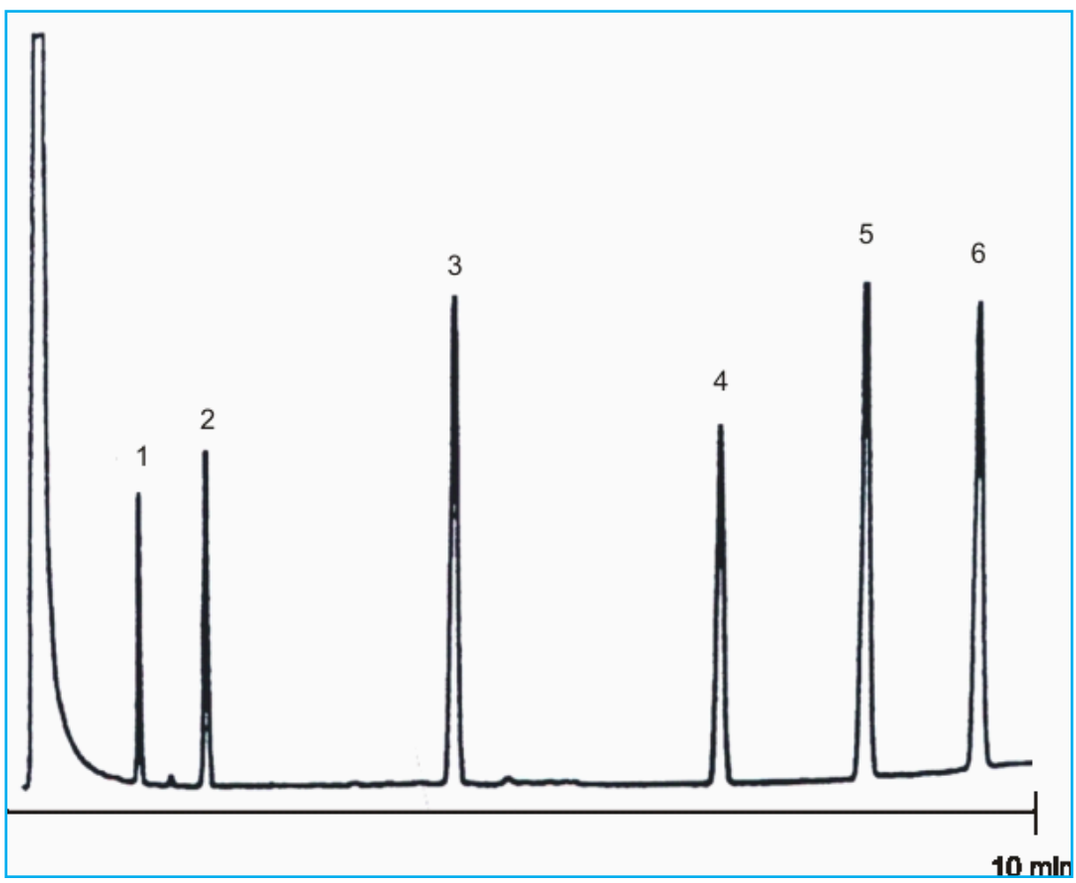
All the parameters are completely optimised according to the real laboratories needs.

Analysis Conditions

Master GC Parameters:

Oven	150°C - 15°C/min - 270°C
Detector	FID 300°C
Injector	SL/IN 250°C
Injection Mode	Splitless
Carrier	He 20 ml/min
Column	DN-1 15m x 0,53mm i.d. x 1,50µm d_f
Sample Volume	1.0 µL

Determination of Phtalates



Peak Identification	
1	dimethyl-phthalate
2	diethyl-phthalate
3	di-*n*-butyl phthalate
4	butyl benzyl phthalate
5	*bis* (2-ethylhexyl) phthalate
6	di-*n*-octyl phthalate

SOIL ANALYSIS

Determination of Haloethers
EPA Method 8111
Application Note AN 069

Haloethers are pollutant compounds not occurring naturally; their presence in the environment is entirely anthropogenic. They are used as solvents, chemical intermediates, soil fumigants, pesticides, fungicides, etc.
Several haloethers have been found to be biodegradable in soil, while others are persistant. In the absence of the degradation process, these compounds are expected to leak to groundwater.
Haloethers are under investigation as a possible cause for different types of human deseases.
EPA method 8111 provides gas chromatographic conditions for the detection of ppb concentration of haloethers in water and soil or ppm concentration in waste samples. These regulatory requirements are achieved in the following analysis RAPIDLY, PRODUCTIVELY and EFFECTIVELY.

SHORTER ANALYSIS TIME FOR A HIGHER PRODUCTIVITY

The faster analysis time and higher performances of the Master GC allow to significantly increase laboratories productivity thus reducing operating costs.

ENHANCED SEPARATION POWER

The primary goal of Fast GC is to mantain proper resolving power in shorter analysis run times by using adequate instrumentation and columns in combination with optimized method parameters without comprimising chromatographic resolution.

COMPLIANCE WITH REGULATORY NORMS

Compliance with the EPA 8111 method

Analysis Conditions

Master GC Parameters:

Oven	100°C - 15°C/min - 300°C
Detector	FID 300°C
Injector	SL/IN 250°C
Split Ratio	1:50
Carrier	He 2,90 psi
Column	DN-5 15m x 0,53mm i.d. x 1,50µm d_f
Sample Volume	0.2 µL

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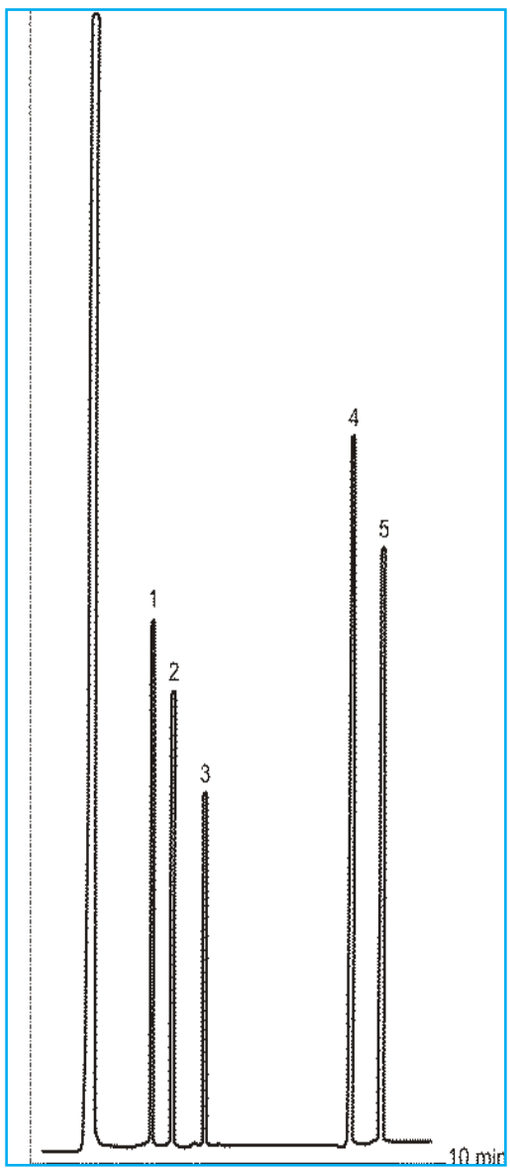
Determination of Haloethers
EPA Method 611/8110



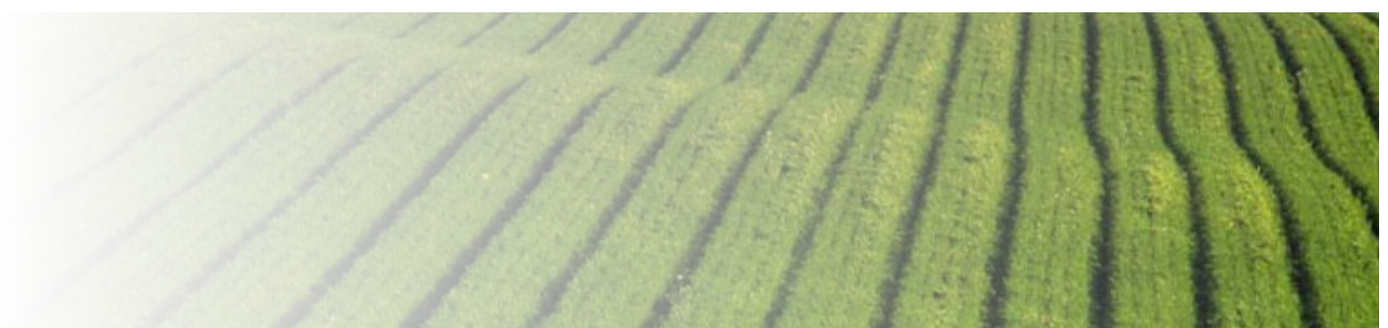
Peak identification	
1	*bis*(2-chloroethyl) ether
2	*bis*(2-chloroisopropyl) ether
3	*bis*(2-chloroethoxy)methane
4	4-chlorophenylphenyl ether
5	4-bromophenyl phenyl ether

SOIL ANALYSIS

Determination of Nitrosamines

Application Note AN 067

Nitrosamines are a family of compounds used in the manifacture of rubber, cosmetics, pesticides, leather, etc. They can be also found in tobacco, cured meats, beer.
Thanks to the massive studies involving Nitrosamines, it has been demonstrated that these compounds are mutagens and carcinogens. In regard to this, worldwide environmental and health related government agencies have imposed restrictions on the use of these substances.
The analysis here below offers a RELIABLE, ACCURATE and PRECISE method for the analysis of Nitrosamines in soil.



RELIABILITY: INCREASED RESISTANCE TO SAMPLE DEGRADATION

No risk of sample degradation or discrimination thanks to the DANI PTV injector

UNPARALLELED CHROMATOGRAPHIC ACCURACY AND PRECISION

The patented Digital Flow Control, along with the optimal control of the oven temperature, assures outstanding retention time repeatability, unprecedented for all chromatographic measurements.

COMPLIANCE WITH REGULATORY NORMS

Analysis Conditions :

Master GC Parameters:

Oven	40°C - 20°C/min - 240°C
Detector	FID 280°C
Injector	PTV 50°C-600°C/min - 240°C
Carrier	H2 10 ml/min
Column	DN-5 15m x 0,53mm i.d. x 1,50µm d_f
Sample Volume	1.0 µL

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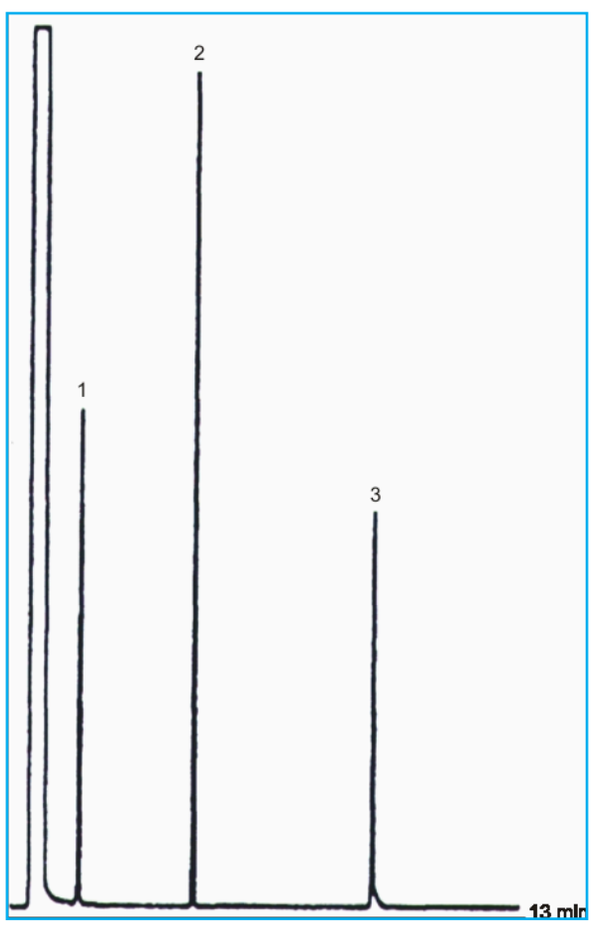
Determination of Nitrosamines
EPA Method 607



Peak identification	
1	*n*-nitrosodimethylamine
2	*n*-nitrosodi-*n*-propylamine
3	*n*-nitrosodiphenylamine

SOIL ANALYSIS

Determination of Phenols and Chlorophenols

Application Note AN 066

Phenols exist in the environment as product of the chemical, petrol, dye and pharmaceutical industries and as a consequence of a number of pesticides and the generation of industrial sewages.
Phenols are one of the first compounds inscribed into the List of Priority Pollutants by the US Environmental Protection Agency for their toxicity.
The dection limits for these types of contaminants in the environment is continually being pushed to lower and lower levels by increasingly sophisticated analytical instrumentation.
The configuration presented here guarantees the ACHIEVEMENT OF LOW LIMITS easily, thanks to a FLEXIBLE SYSTEM, SIMPLE TO SET UP AND TO CONTROL.

FLEXIBILITY

Unlike other GC systems, which are equipped with a dedicated and expensive column device, the Master GC can be operated in Fast GC without any hardware modification and hence keeping column integrity unaffected.

QUICK AND EASY SET UP

The Master GC incorporates an intuitive and easy-to-use touchscreen interface that provides quick and easy set up and control. The system can also be controlled by the functional and user-friendly CLARITY ™ Chromatography Station.

Analysis Conditions :

Master GC Parameters:

Oven	110°C - 8°C/min - 280°C
Detector	FID 300°C
Injector	SL/IN 300°C
Split Flow	1:100
Carrier	H2 8,70 psi
Column	DN-5 25m x 0,32mm i.d. x 1,00µm d_f
Sample Volume	1.0 µL

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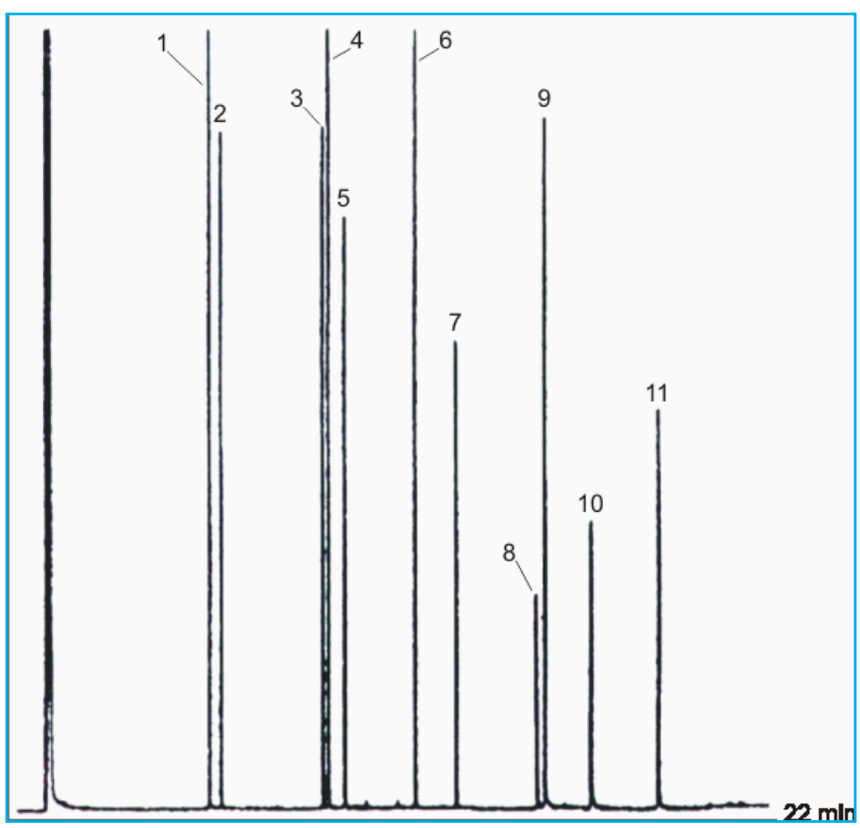
Determination of Phenols and Chlorophenols
EPA Method 604



Peak identification			
1	phenol	7	2,4,6-trichlorophenol
2	2-chlorophenol	8	2,4-dinitrophenol
3	2-nitrophenol	9	4-nitrophenol
4	2,4-dimethylphenol	10	2-methyl-4,6-ditrophenol
5	2,4-dichlorophenol	11	pentachlorophenol
6	4-chloro-3-methylphenol		

SOIL ANALYSIS

Determination of Organichlorinated Pesticides
EPA Method 8081
Application Note AN 063

Organochlorinated pesticides have a long history of widespread use and are persistent organic pollutants. Traces of these pesticides can be found in the environment in the top layer soils more than twenty years after they have been banned. They have significant toxicity to plants, animals and humans, accumulating in food chains.
EPA Method 8081 is used to determine the concentrations of various organochlorine pesticides in extracts from solid and liquid matrices.
The aim of this work is to show a solution for the analysis of pesticides that allows to REDUCE TIME and, at the same time, to ENHANCE SENSITIVITY for a SIGNIFICANT IMPROVEMENT OF LABORATORY PRODUCTIVITY.

REDUCED ANALYSIS TIME

The versatile and flexible Master GC is uniquely designed to perform conventional and fast chromatographic analyses.

ENHANCED SENSITIVITY

The Electron Capture Detector is the option of choice for environmental measurements offering high sensitivity and excellent performances in the determination of organochlorinated pesticides.

HIGH PRODUCTIVITY

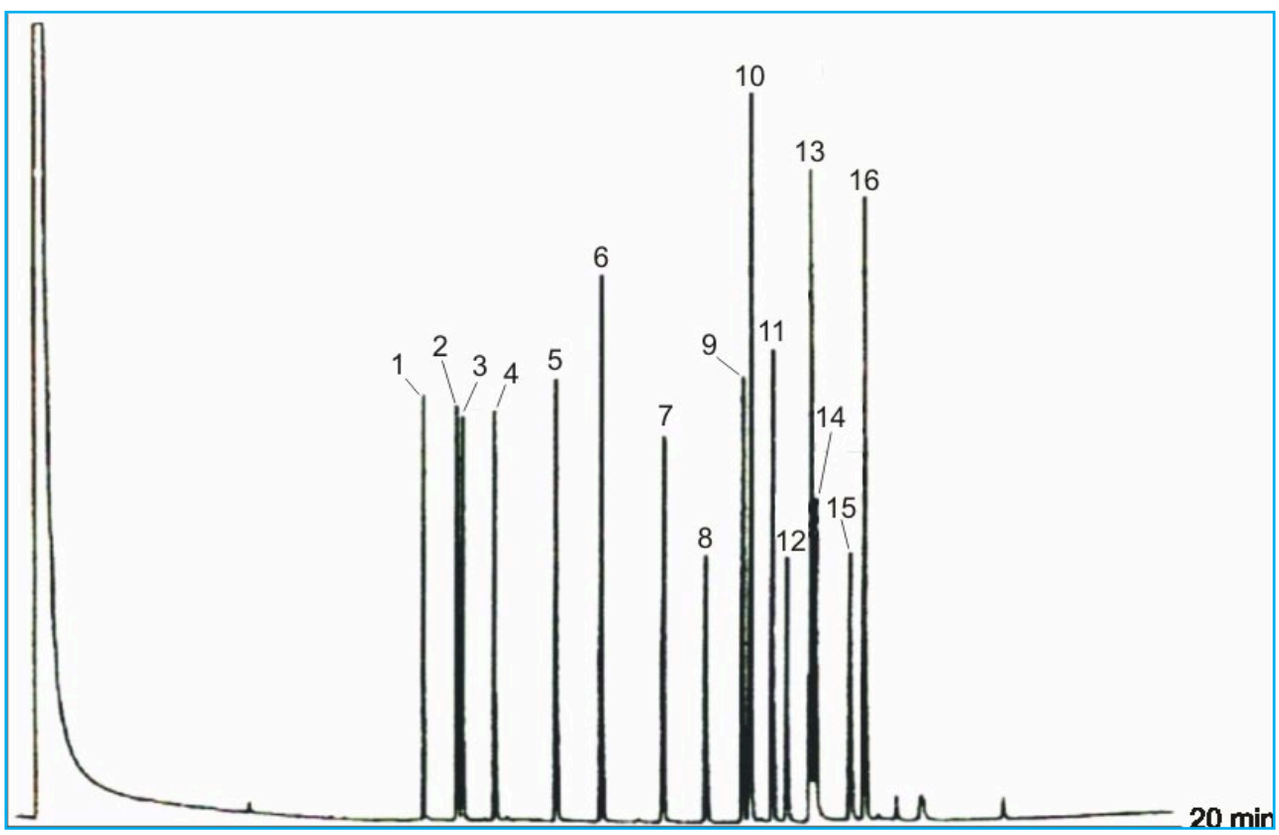
The use of automated instrumentation and Fast GC methods are the perfect approach for modern laboratories to enhance their productivity reducing analysis time while maintaining analytical accuracy and precision unaffected.

Analysis Conditions

Master GC Parameters:

Oven	65°C - 20°C/min - 150°C - 7°C/min - 260°C
Detector	ECD 280°C
Injector	PTV 50°C, 600°C/min, 260°C
Carrier	H_2 8,70 psi
Column	DN-5 25m x 0,32mm i.d. x 0,25µm d_f
Sample Volume	1.0 µL

Determination of Organichlorinated Pesticides
EPA Method 8081



Peak identification			
1	α - BHC	9	4,4′ DDE
2	β - BHC	10	dieldrin
3	γ - BHC	11	endrin
4	δ - BHC	12	4.4′ DDD
5	heptachlor	13	endosulfan II
6	aldrin	14	endrin aldehyde
7	heptachlor epoxide	15	4,4′ DDT
8	endosulfan I	16	endosulfan sulfate

SOIL ANALYSIS

Determination of Organophosphorus Pesticides

Application Note AN 095

Organophosphorus Pesticides are among the most widely used class of pesticides thanks to their high efficacy against pests. They are also well known for their poisoning effects on human health as the over-exposure to organophosphorus pesticides may cause irreversible damage to the nervous system and have neurotoxic effects on developing organisms. They can be, in fact, absorbed by inhalation, ingestion, and dermal absorption.
These compounds also represent a concrete risk for the environment. There are concerns about their persistance in soil since they are widely used as fertilizers.
EPA Method 622 is a gas chromatographic (GC) method appliable to the determination of certain organophosphorus pesticides in industrial and municipal discharges as provided under 40 CFR 136.1
The following analysis offers a solution to INCREASE PEAK RESOLUTION and ENHANCE SENSITIVITY, meeting methods' requirements.

INCREASED PEAK RESOLUTION

The dedicated column permits an optimal resolution

ENHANCED SENSITIVITY

Flame Photometric Detector is the detector of choice for the detection of phosphorus compounds, increasing the sensitivity of the system, and allowing to reach and to exceed the methods' requirements.

Analysis Conditions

Master GC Parameters:

Oven	100°C (1 min), 5.5°C/min - 230°C - 30°C/min - 270°C
Detector	FPD 140°C
Injector	SL/IN 240°C
Split	Splitless
Carrier	H_2 10,15 psi
Column	DN-68 25m x 0,32mm i.d. x 0,25µm d_f
Volume Injected	1.0 µL

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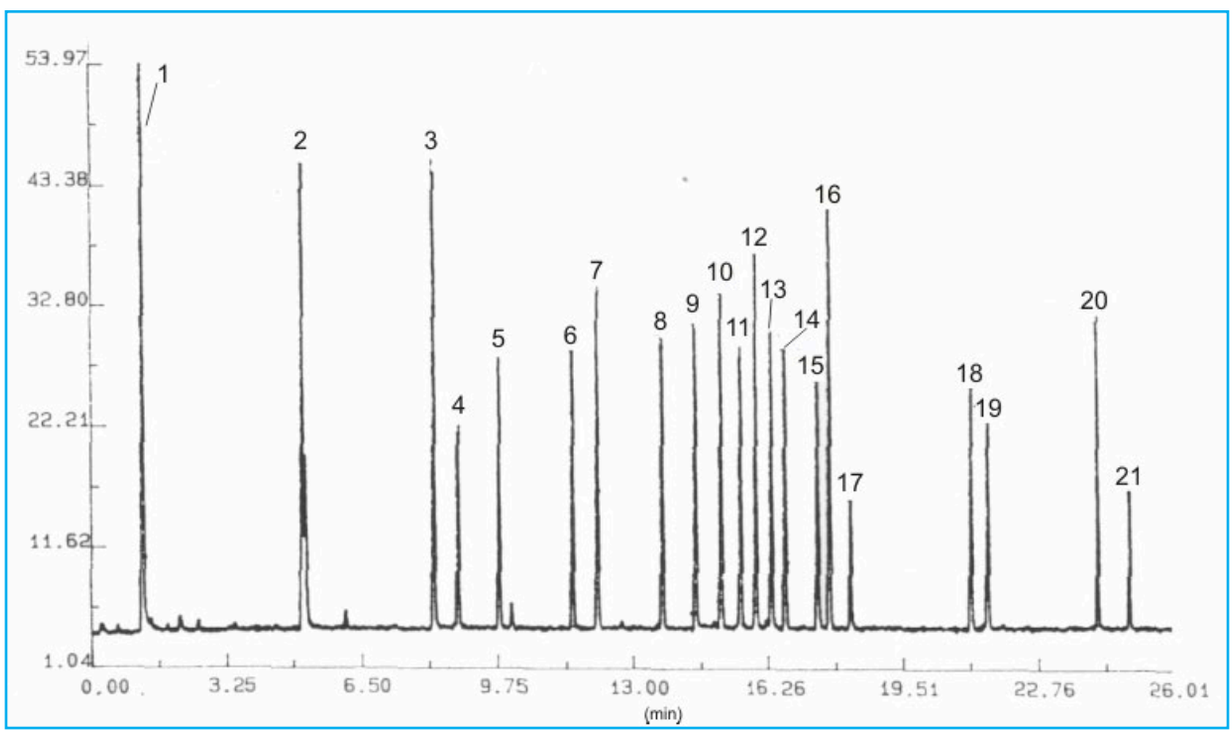
Determination of Organophosphorous Pesticides



Peak identification			
1	trichlorfon	2	phosdrin
3	tionazine	4	ethoprophos
5	phorate	6	phonophos
7	diazinone	8	CH3-chlorpyriphos
9	CH3-parathion	10	CH3-pirimiphos
11	chlorpyriphos	12	malathion
13	parathion	14	pirimiphos
15	quinalphos	16	C2H5-bromophos
17	metidathion	18	ethion
19	trithion	20	CH3-azinphos
21	C2H5-azinphos		